Morrison

DINOSAURS!

•DISCOVER THE GIANT ORIC WORLD•

55

SOR

UK £1.50
Republic of Ireland IR£1.50
Australia $3.75; Malta 75c
New Zealand $4.75 inc. GST
South Africa R6.75 inc. VAT
R6.14 (excl. Tax – other countries)
Singapore $4.50; Malaysia $5.50

ORBIS
DE AGOSTINI
GROUP

AN ORBIS PLAY & LEARN COLLECTION

DINOSAURS!

• DISCOVER THE GIANTS OF THE PREHISTORIC WORLD •

IDENTIKIT

Meet two dynamic dinosaurs and a swimming reptile

ULTRASAUROS 1297

MESOSAURUS 1300

HARPYMIMUS 1301

PREHISTORIC WORLD

FANTASTIC FISHES 1302

SPOTTER'S GUIDE

Discover life underwater

IN THE SWIM 1310

TIME DETECTIVE

Read all about the famous dinosaur experts and their exciting discoveries in

DINOSAUR DETECTIVES 1312

HISTORY IN PICTURES

A DAY IN THE LIFE OF PTERANODON 1316

A to Z

More prehistoric animals with names beginning with A 1320

ASK THE EXPERT

Dr David Norman of Cambridge University answers more of your dinosaur queries BACK COVER

PLUS

GIANTS OF THE PAST

Gentle giants *Ultrasauros* browse on tall Jurassic trees 1306

3-D Gallery

Hungry *Baryonyx* tears at the flesh of a dead *Iguanodon* 1308

FACT FILE

Improve and test your prehistoric knowledge 1318

HOW TO CONTINUE YOUR COLLECTION

Most people collect their issues by placing a regular order with their newsagent. You can, however, also obtain your copies directly in the following ways:

UK and REPUBLIC OF IRELAND
Subscriptions:
Phone 0424 755755 for information (Mon-Fri, 9am-5pm).
Back issues:
If you miss any issues of DINOSAURS!, these can be ordered through your newsagent. Alternatively, you can order back issues by phoning 0424 755755 (Mon-Fri, 9am-5pm). Credit card orders accepted. Or write to: Back Issues Department, DINOSAURS!, PO Box 1, Hastings, TN35 4TJ.
Back issue charges: Issue 1: 30p. All other issues: £1.50. Postage and packing: 50p per copy. When ordering, please enclose:
1. Your name, address and postcode.
2. The issue number(s) and number of copies of each issue you require.
3. Your payment. This can be by postal order or cheque made payable to Orbis Publishing Ltd. You can calculate the amount based on the charges shown above.
Binders:
UK
DINOSAURS! binders are now available. Each binder holds 13 issues and costs just £4.95 (including £1 p&p).
You can order binders direct from: DINOSAURS!, PO Box 1, Hastings, TN35 4TJ. Please enclose payment for £4.95 for each binder. You can pay by cheque or postal order made payable to Orbis Publishing Limited, or phone 0424 755755. Telephone credit card orders are accepted.
Republic of Ireland
Binders are available through your newsagent, priced at £4.95.

AUSTRALIA
Back issues: Write to: Gordon & Gotch Ltd, P.O. Box 290, Burwood, Victoria 3125. Please enclose your payment of the cover price plus $1 per issue p&h.
Binders: Details will be published in future issues. Or you can write to: DINOSAURS! Binders, Bissett Magazine Service Pty Ltd, MC Box 460, Eastern Mail Centre, Victoria 3311O.

NEW ZEALAND
Back issues: Write for details to: Gordon & Gotch Ltd, P.O. Box 584, Auckland.
Binders: Details will be published in future issues. Or you can write for details to the address above.

MALTA
Back issues: These can be ordered through your newsagent.
Binders: Write for details to: Miller (Malta) Ltd, Valetta.

SOUTH AFRICA
Back issues: Telephone 011 402 3816 for details. Or write to: Back Issues Department, Republican News Agency, PO Box 16034, Doornfontein, 2028. Please enclose your payment of the cover price plus 2 Rand per issue p&h.
Binders: These can be obtained at the shop where you bought this magazine.

SINGAPORE, MALAYSIA
Back issues and binders:
These can be obtained at the shop where you bought this magazine.

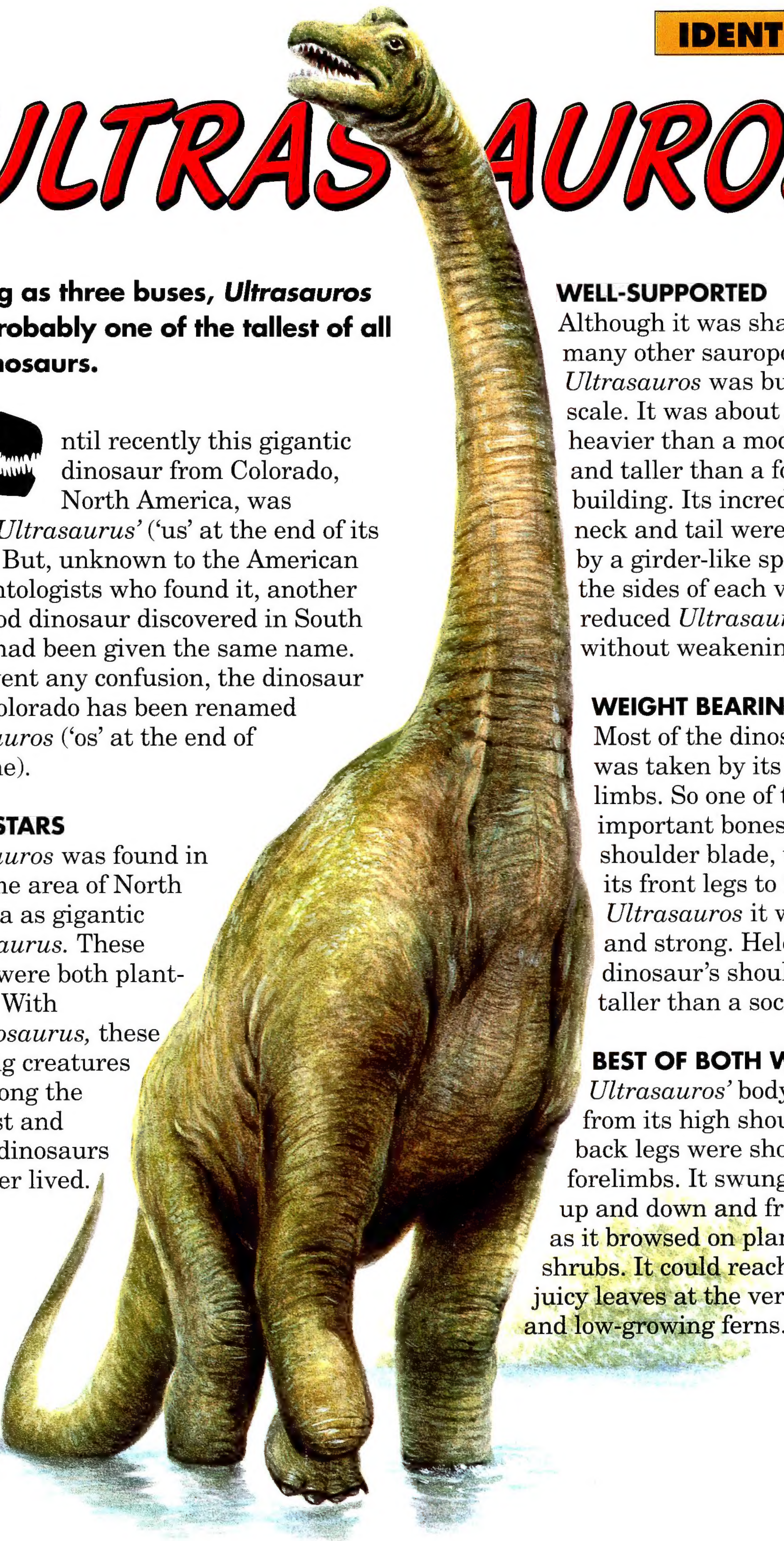
DINOSAURS! is published by
Orbis Publishing Ltd
Griffin House
161 Hammersmith Rd
London W6 8SD

© 1994 Orbis Publishing

N55 94 04 21
ISBN 0 7489 1655 5

Printed in Italy by Officine Grafiche De Agostini, Novara

ULTRASAUROS



As long as three buses, *Ultrasauros* was probably one of the tallest of all the dinosaurs.

Until recently this gigantic dinosaur from Colorado, North America, was called *'Ultrasaurus'* ('us' at the end of its name). But, unknown to the American palaeontologists who found it, another sauropod dinosaur discovered in South Korea had been given the same name. To prevent any confusion, the dinosaur from Colorado has been renamed *Ultrasauros* ('os' at the end of its name).

SUPERSTARS

Ultrasauros was found in the same area of North America as gigantic *Supersaurus.* These giants were both plant-eaters. With *Brachiosaurus,* these amazing creatures are among the heaviest and tallest dinosaurs that ever lived.

WELL-SUPPORTED

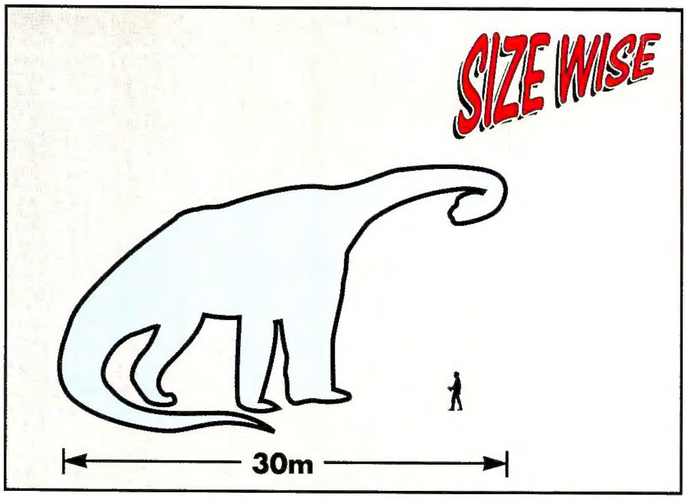
Although it was shaped like many other sauropods, *Ultrasauros* was built on a huge scale. It was about 25 times heavier than a modern giraffe and taller than a four storey building. Its incredibly long neck and tail were supported by a girder-like spine. Gaps in the sides of each vertebra reduced *Ultrasauros'* weight without weakening its back.

WEIGHT BEARING BONE

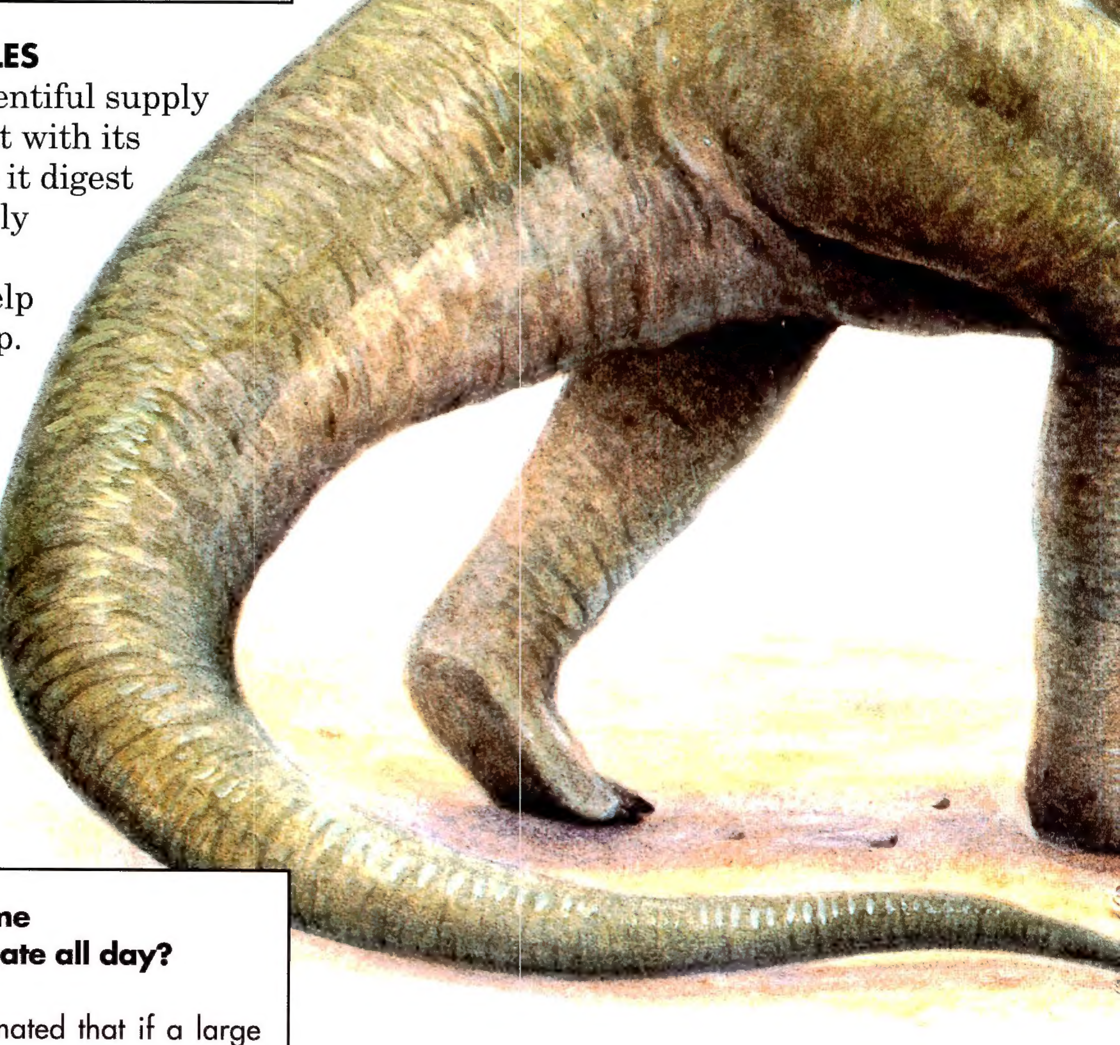
Most of the dinosaur's weight was taken by its gigantic limbs. So one of the most important bones was the shoulder blade, which joined its front legs to its body. In *Ultrasauros* it was both large and strong. Held upright, this dinosaur's shoulder blade was taller than a soccer goal post!

BEST OF BOTH WORLDS

Ultrasauros' body sloped down from its high shoulders as its back legs were shorter than the forelimbs. It swung its long neck up and down and from side to side as it browsed on plants and shrubs. It could reach both the juicy leaves at the very top of trees and low-growing ferns.



These huge herbivores had to eat enormous quantities of vegetation to stay alive.



STONES AND VEGETABLES

Ultrasauros needed a plentiful supply of vegetation which it cut with its chisel-like teeth. To help it digest this, *Ultrasauros* probably swallowed small stones which lay in its gut to help grind plant food to a pulp.

SLOW-MOVING HERDS

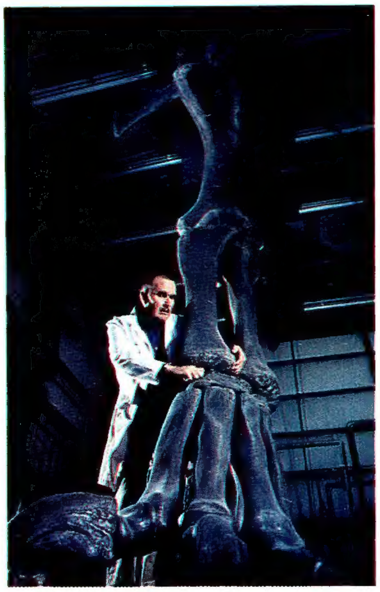
Although it is hard to imagine, experts have suggested that brachiosaurids like *Ultrasauros* wandered around in slow-moving herds. The ground must have trembled beneath their feet!

Is it true that some sauropods ate all day?

Experts have estimated that if a large sauropod such as *Brachiosaurus* was endothermic (that is it generated its own body heat like mammals and birds) it would need about 200kg of plant food per day to keep alive and healthy. That's about the same weight as 260 large boxes of cornflakes.

TOO BIG TO TACKLE

The sheer size and bulk of an animal like *Ultrasauros* probably put off most predators that lived at the same time. But if one became isolated from the rest of a herd, it was exposed to danger.



'Dinosaur Jim' – James Jensen – with the gigantic leg bones of *Ultrasauros*.

MONSTER FACTS

- **NAME:** *Ultrasauros* (ull-tra-saw-ros) means 'ultra reptile'
- **GROUP:** dinosaur
- **SIZE:** up to 30m long
- **FOOD:** plants
- **LIVED:** about 145 million years ago in the Late Jurassic Period in Colorado, North America

HIDDEN WEAPON

On the inside of its elephant-like foot, *Ultrasauros* had a sharp claw. With a well-aimed kick and a swipe of its whiplash tail, *Ultrasauros* could send its enemy flying back into the bushes.

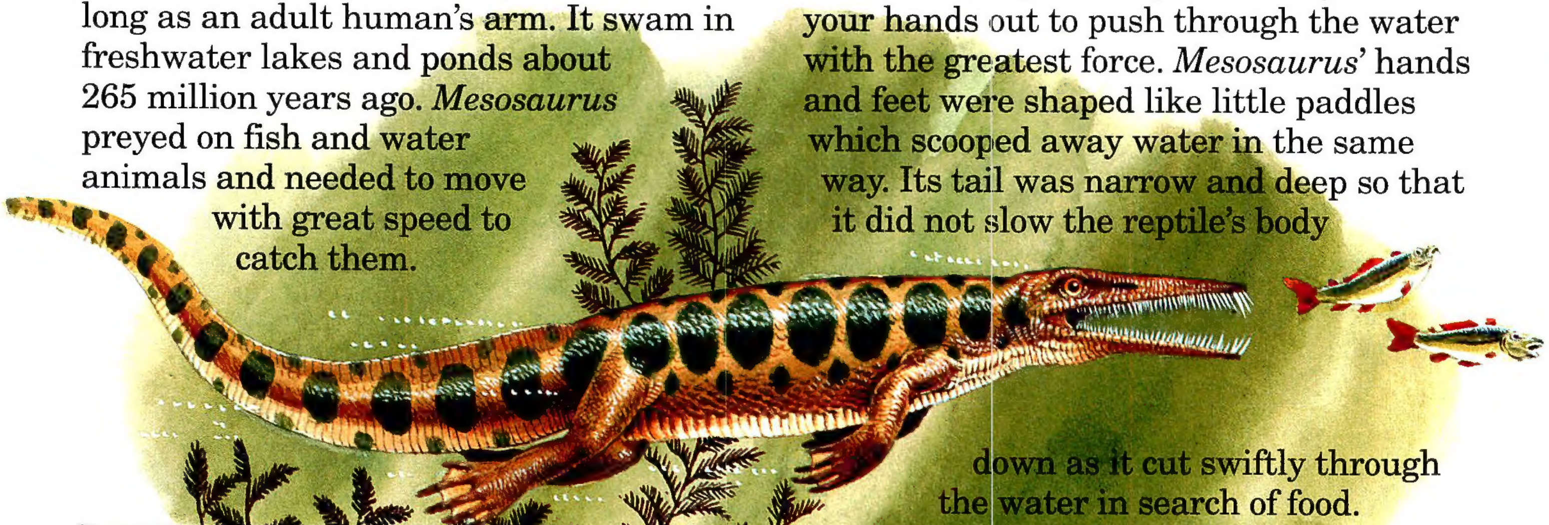
MESOSAURUS

Little *Mesosaurus* helped a scientist to prove an important theory about how our Earth developed.

In 1911, a German scientist called Alfred Wegener noticed that the small reptile, *Mesosaurus*, had been found in Permian rocks in both South America and Africa. But it did not appear anywhere else in the world. When he had collected more evidence, Wegener put forward his idea that all continents were once joined together in one 'supercontinent' which he called Pangaea.

FISHY DINNERS

Mesosaurus was a small reptile, about as long as an adult human's arm. It swam in freshwater lakes and ponds about 265 million years ago. *Mesosaurus* preyed on fish and water animals and needed to move with great speed to catch them.

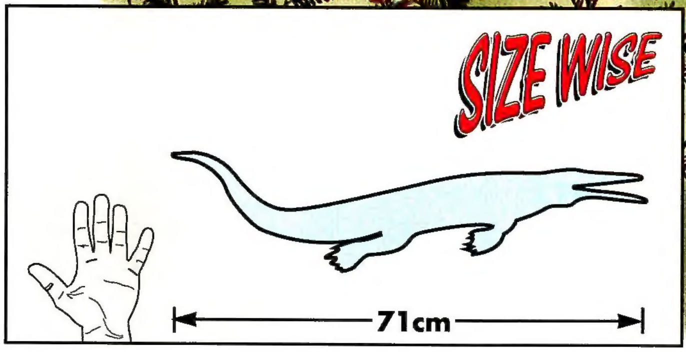


MONSTER FACTS

- **NAME:** *Mesosaurus* (me-zoh-saw-rus) means 'middle reptile'
- **GROUP:** reptile
- **SIZE:** 71cm long
- **FOOD:** small freshwater fish and water creatures
- **LIVED:** about 265 million years ago in the Permian Period in the freshwater lakes and ponds of Brazil and South Africa

SUPER SWIMMER

Its long, slender body gave the reptile a streamlined shape which was perfect for fast swimming. When you swim, you turn your hands out to push through the water with the greatest force. *Mesosaurus*' hands and feet were shaped like little paddles which scooped away water in the same way. Its tail was narrow and deep so that it did not slow the reptile's body down as it cut swiftly through the water in search of food.



SUDDEN SNAP

Mesosaurus had long, slender jaws like a crocodile. They were full of needle-like teeth. As it glided through the water, it took mouthfuls of tiny water creatures and fish and strained the water away through its teeth before it swallowed its prey.

HARPYMIMUS

Speedy *Harpymimus* could pluck flying insects from the air and chase fast-moving lizards.

One of the earliest ornithomimosaurs, *Harpymimus*, had a unique feature which none of its relatives shared. At the front of its upper and lower jaw were ten or more tiny teeth.

MONSTER FACTS

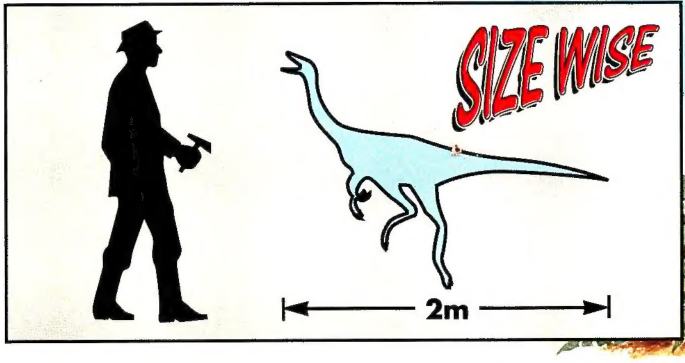
- **NAME:** *Harpymimus* (har-pih-mime-us) means 'harpy mimic'
- **GROUP:** dinosaur
- **SIZE:** about 2m long
- **FOOD:** lizards, insects and possibly plants
- **LIVED:** about 100 million years ago in the Cretaceous Period in Mongolia

ON THE LOOKOUT

Harpymimus had large eyes set on either side of its head. Always on the alert, it twisted its neck and head from side to side so that it could look all around. If attacked by a predator, *Harpymimus* relied on its two long legs to make a quick getaway.

LEAVES AND LIZARDS

Harpymimus ate all sorts of food. It probably browsed among trees and shrubs and could also run fast enough to catch insects, lizards and even small mammals in its narrow jaw.



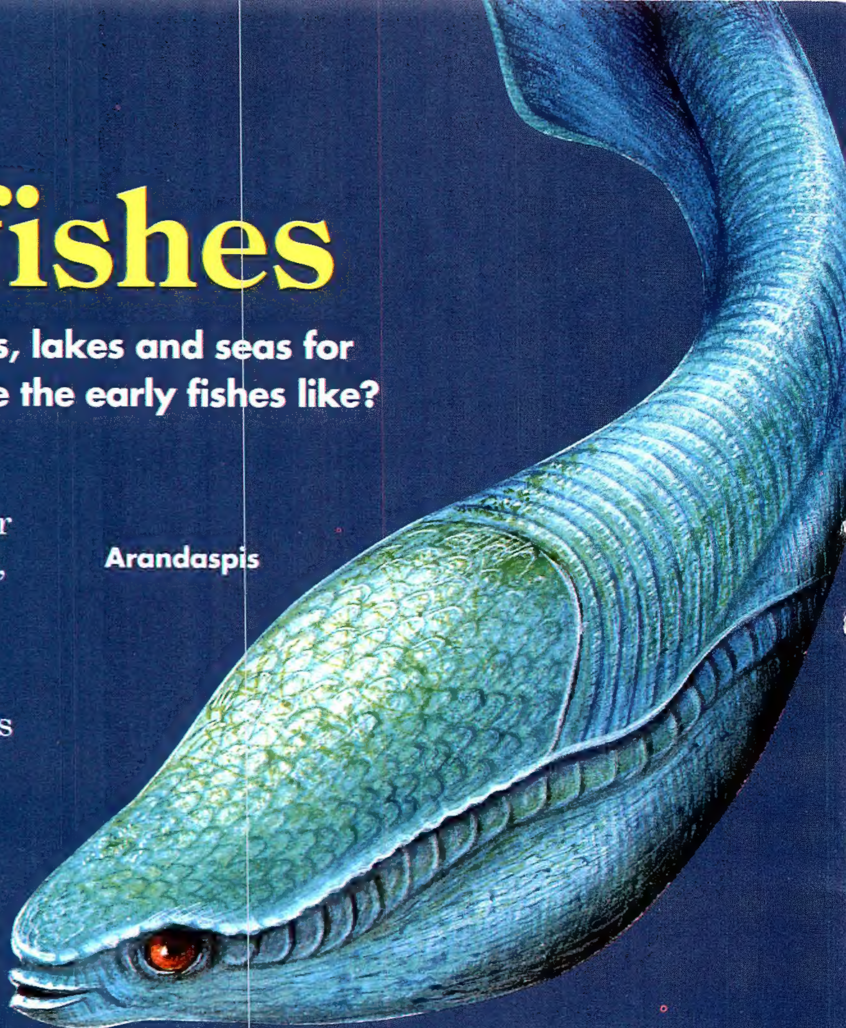
Fantastic fishes

Fishes have been the masters of rivers, lakes and seas for nearly half a billion years. What were the early fishes like?

In the world today, there are over 21,000 kinds of fishes. That's over twice the number of bird species, and five times the number of mammals.

THE FIRST VERTEBRATES

Fishes were the first vertebrates – animals with backbones. The vertebrates include all fishes, amphibians, reptiles, birds and mammals. The fishes appeared in the oceans over 500 million years ago.



Arandaspis

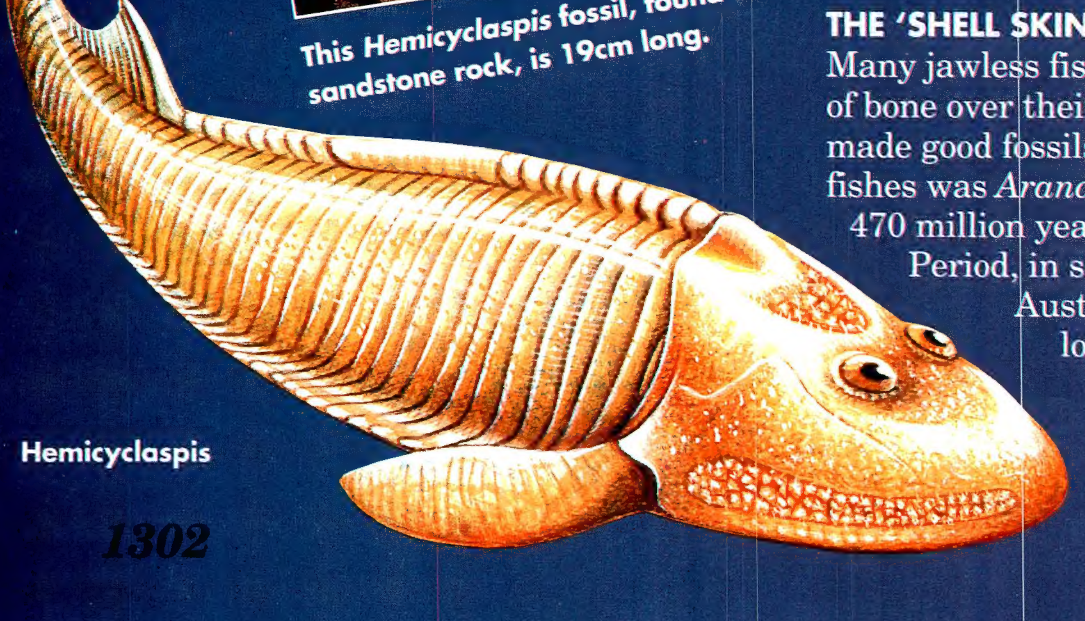
This *Hemicyclaspis* fossil, found in sandstone rock, is 19cm long.

LOOK, NO JAWS

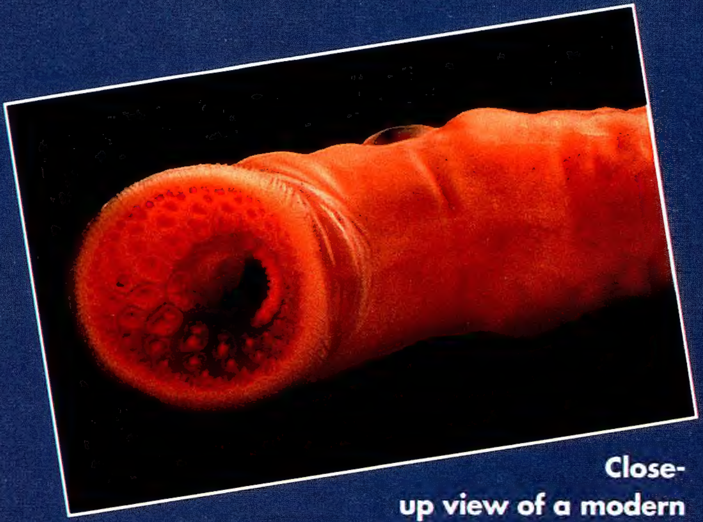
The first fish had no proper fins. They had no proper jaws either. They were called agnathans, or jawless fishes. They had round mouths and sucked up small bits and pieces of food from the sea bed. Some grubbed in the mud, some sucked the meat off dead sea creatures, and some filtered tiny animals from the water.

THE 'SHELL SKINS'

Many jawless fishes had protective plates of bone over their bodies. These plates made good fossils. One of the first jawless fishes was *Arandaspis* which lived about 470 million years ago in the Ordovician Period, in seas that covered Australia. It was about 15cm long, with a strong back shield covered by tiny studs, and two tiny eyes near the front.



Hemicyclaspis



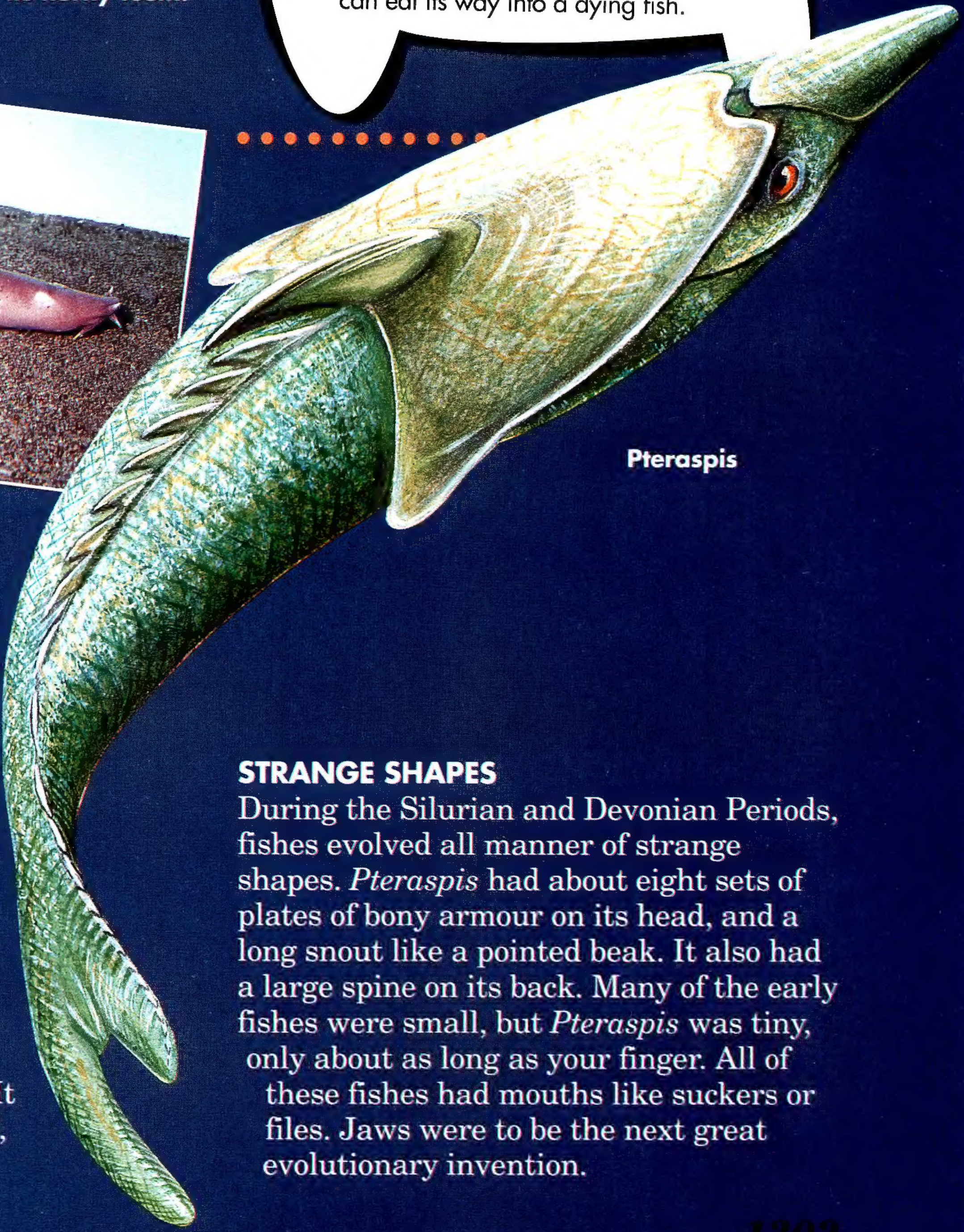
Close-up view of a modern lamprey's circular mouth showing its horny teeth.

IT'S A FACT

THAT THERE ARE STILL JAWLESS FISHES TODAY

There are two main kinds of fishes today that have no jaws: lampreys and hagfishes. A lamprey clamps its mouth on to a larger fish, and sucks out the blood and fluids. The hagfish looks like a slimy, eye-less worm. It has a rasping tongue and can eat its way into a dying fish.

This hagfish, seen here with its eggs, is a modern jawless fish. It is very like the first fishes that lived in the Ordovician Period.



Pteraspis

LIFE ON THE BOTTOM

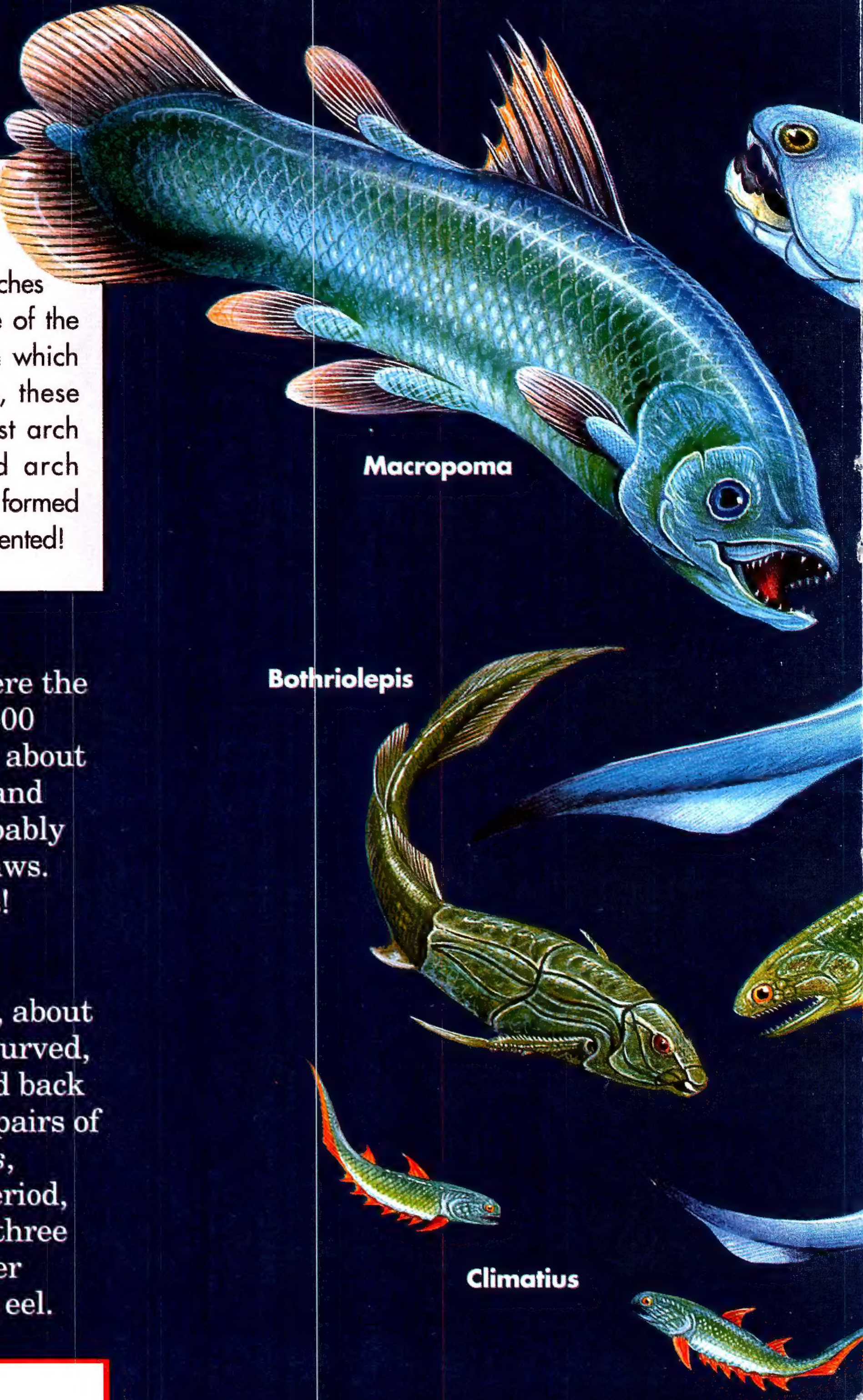
Another jawless fish was *Hemicyclaspis*, which lived about 400 million years ago. Again, it was small – up to 19cm long. It had a rounded head shield and eyes on the top of its head. It was covered in scales, and had the beginnings of a tail. It probably lived on the sea bed, sucking food from the ooze.

STRANGE SHAPES

During the Silurian and Devonian Periods, fishes evolved all manner of strange shapes. *Pteraspis* had about eight sets of plates of bony armour on its head, and a long snout like a pointed beak. It also had a large spine on its back. Many of the early fishes were small, but *Pteraspis* was tiny, only about as long as your finger. All of these fishes had mouths like suckers or files. Jaws were to be the next great evolutionary invention.

Is it true that jaws evolved from gills?

Probably. The first fishes had arches of cartilage or bone on each side of the head. These supported the gills, through which fishes breathed. Over millions of years, these arches changed and developed. The first arch formed part of the skull. The second arch developed into the jaws and the third one formed the jaw joint. And hey presto, biting was invented!

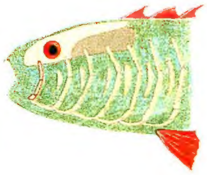


THE COMING OF JAWS

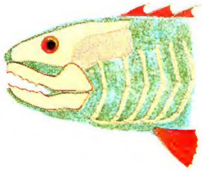
Another big group of early fishes were the acanthodians. They evolved about 400 million years ago and flourished for about 150 million years.They were small and lived in fresh water. They were probably the first of all vertebrates to have jaws. Now fishes could open their mouths!

FISH-FINGER-SIZED FISH

Climatius was a small acanthodian, about the size of a fish-finger. It had two curved, shark-like fins on its back, front and back fins on its belly, and also five extra pairs of fins along its underside. *Acanthodes*, which lived during the Devonian Period, was about 30cm long and had only three sets of fins. It also had fewer, smaller scales, and looked more like today's eel.



The first jawless fishes had nine arches of bone that protected their delicate gills.



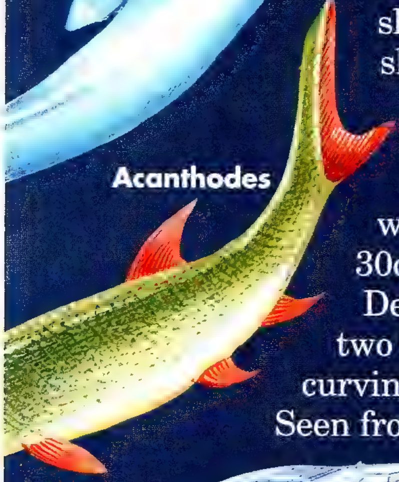
Gradually, over millions of years these bones altered to form part of the skull and the jaws of later fishes.

MORE ARMOURED FISHES

The placoderms, or 'plated skins', also had jaws and bony armour over their heads and the fronts of their bodies. But this armour was jointed, so they could twist their heads and necks. With several sets of fins, they looked more like modern fishes. They lived over 400 million years ago.

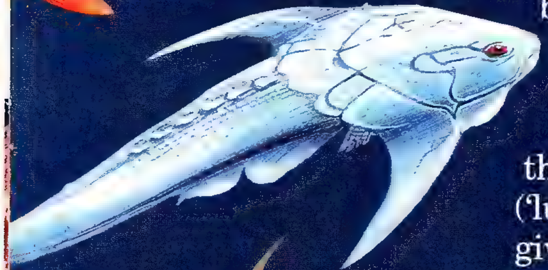
BONY TEETH

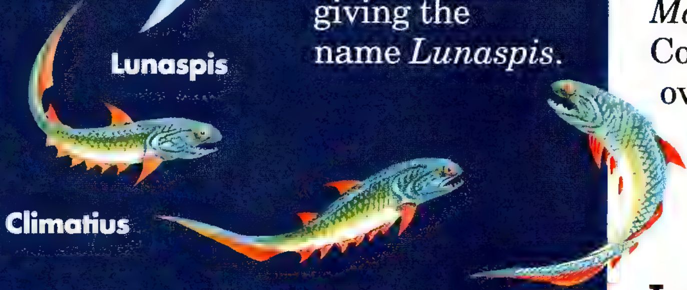
Coccosteus was a placoderm from the middle of the Devonian Period, about 380–370 million years ago. It was around 50cm long. Like all of these early fishes, it did not have proper teeth. But the bony plates covering its upper and lower jaws formed sharp, tooth-shaped ridges that could slice flesh from a victim.



LOONY FISH

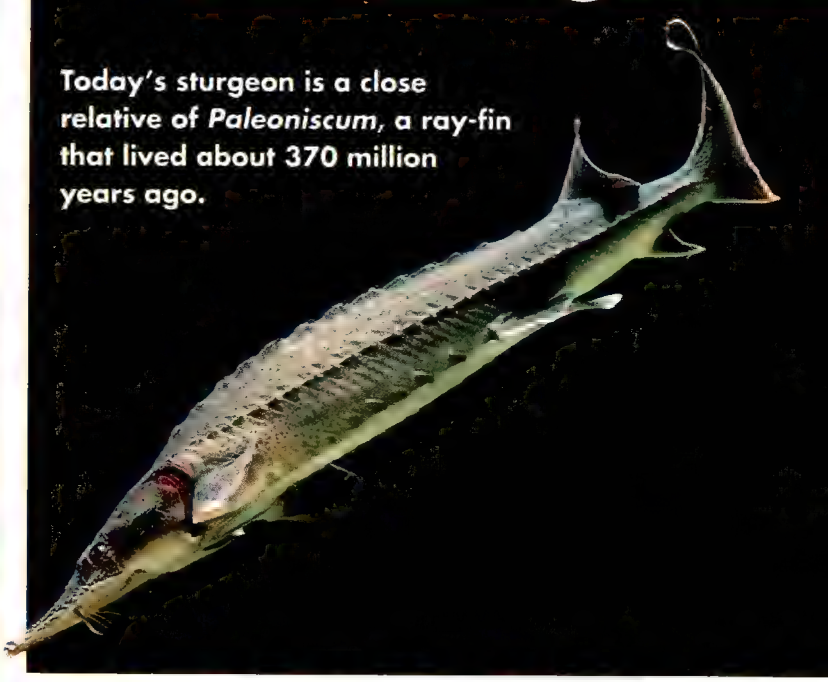
Another placoderm was *Lunaspis*, about 30cm long, from the early Devonian Period. It had two large plates of bone curving back from its head. Seen from above, these curved bony plates look like the crescent of the moon ('luna' in Latin), giving the name *Lunaspis*.





CRAB-LEG FINS

Bothriolepis, also a placoderm, had front fins that looked like crab's legs. They were rounded, hollow tubes each with two joints. No other vertebrate animal had such limbs. *Bothriolepis* was about 35cm long and had a small, weak mouth, so it probably fed on small, soft bits of food.



Today's sturgeon is a close relative of *Paleoniscum*, a ray-fin that lived about 370 million years ago.

BEGINNINGS OF BONY FISHES

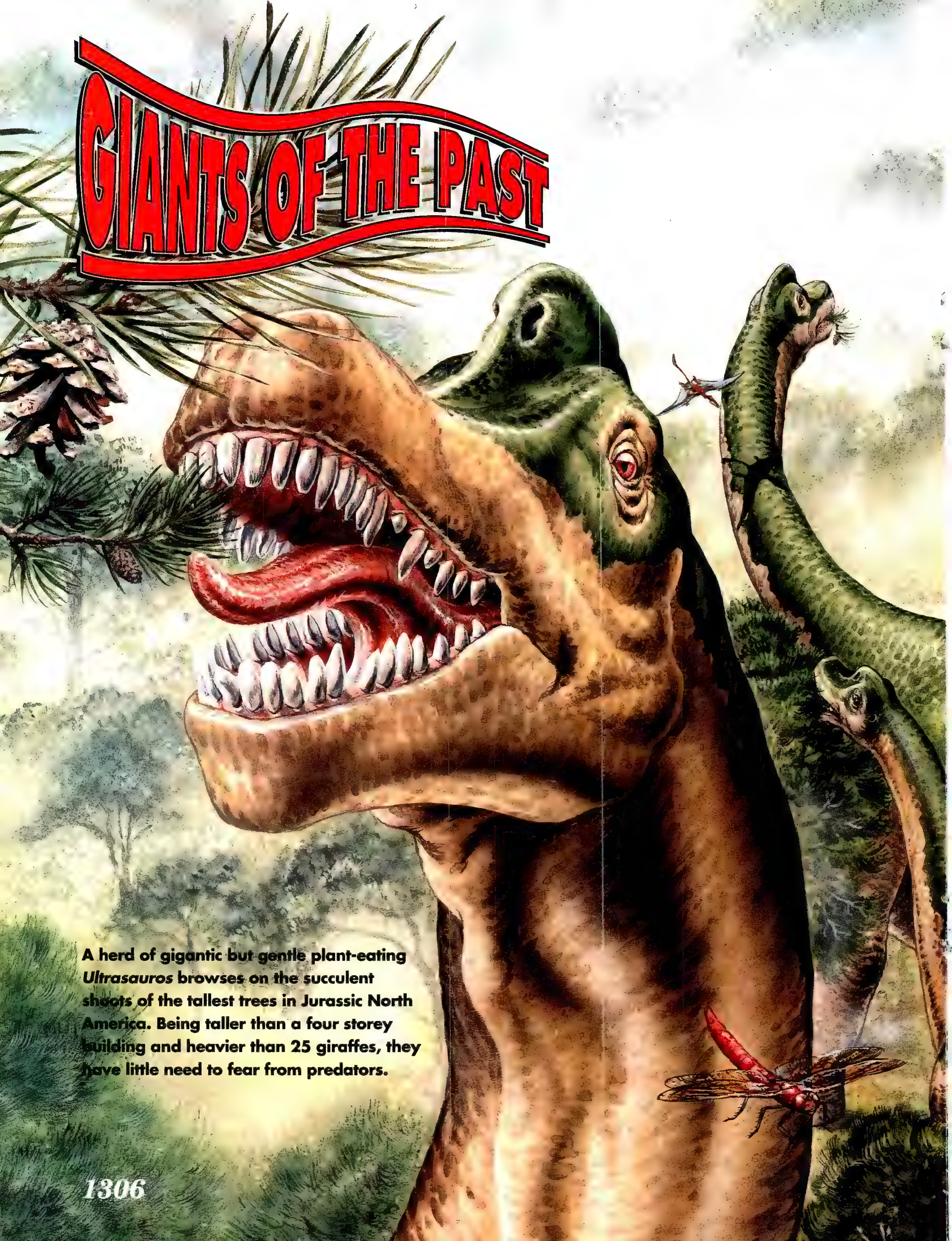
Most fishes alive today are bony fishes. These appeared about 370 million years ago. Most belong to a group called ray-fins. *Paleoniscum*, an early ray-fin, was related to today's sturgeon. *Lepidotes* swam in the seas during the Jurassic, when dinosaurs ruled the world, as did *Leptolepis*.

THE LOBE-FINS

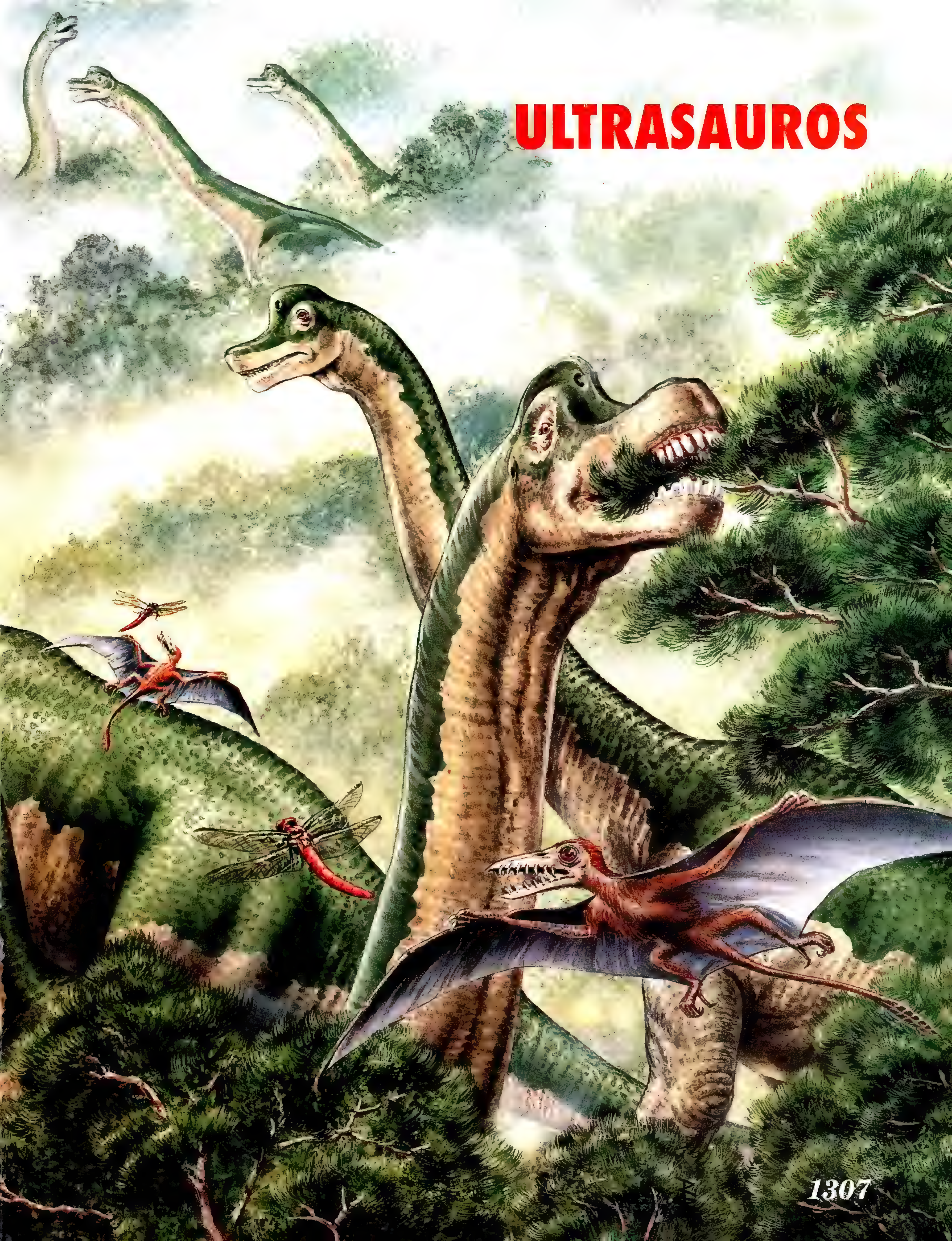
Another group of bony fishes was the lobe-fins. *Eusthenopteron* was probably a link in the evolution from fishes to amphibians. *Macropoma* was an early coelacanth. Coelacanths were thought to have died out over 60 million years ago until one was discovered in the 1930s, swimming in the seas near south-east Africa. A fossil had come back to life!

Today's coelacanth is a living fossil!

GIANTS OF THE PAST



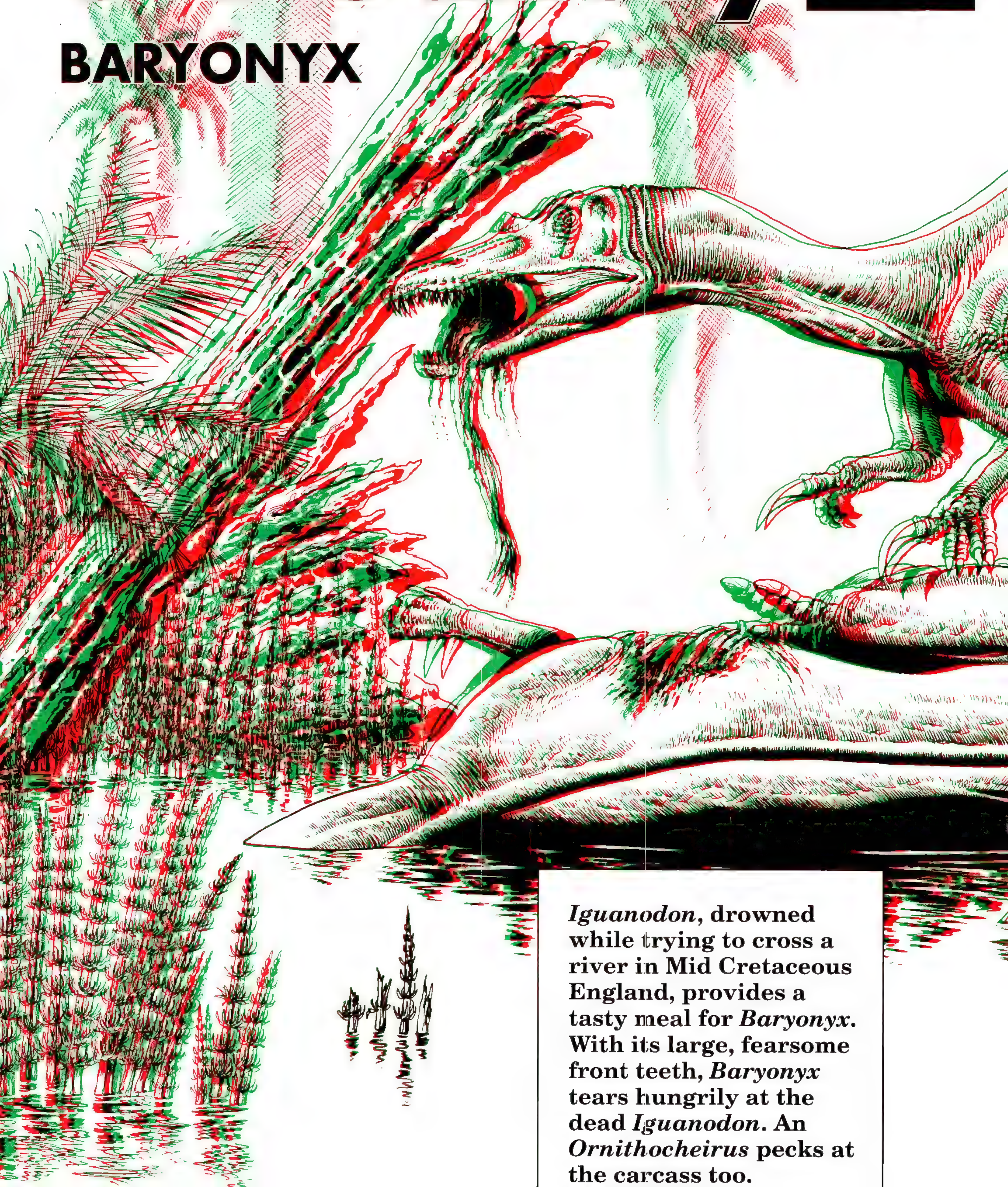
A herd of gigantic but gentle plant-eating *Ultrasauros* browses on the succulent shoots of the tallest trees in Jurassic North America. Being taller than a four storey building and heavier than 25 giraffes, they have little need to fear from predators.



ULTRASAUROS

3-D Gallery 64

BARYONYX

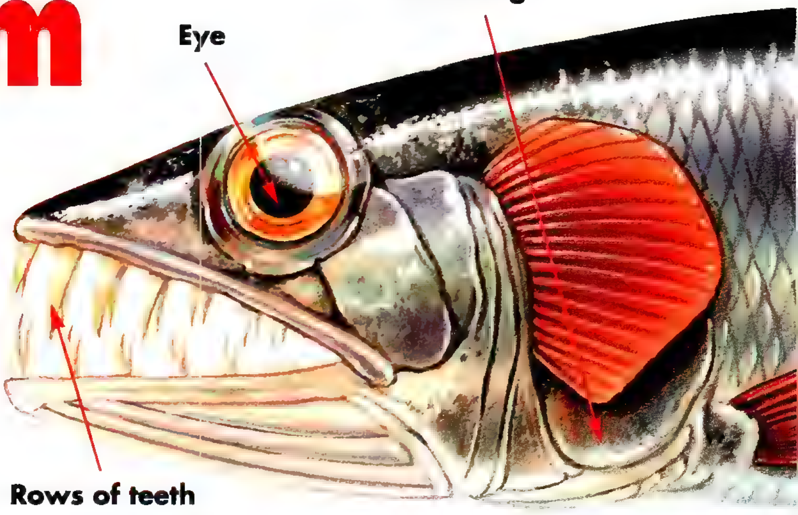


Iguanodon, drowned while trying to cross a river in Mid Cretaceous England, provides a tasty meal for *Baryonyx*. With its large, fearsome front teeth, *Baryonyx* tears hungrily at the dead *Iguanodon*. An *Ornithocheirus* pecks at the carcass too.

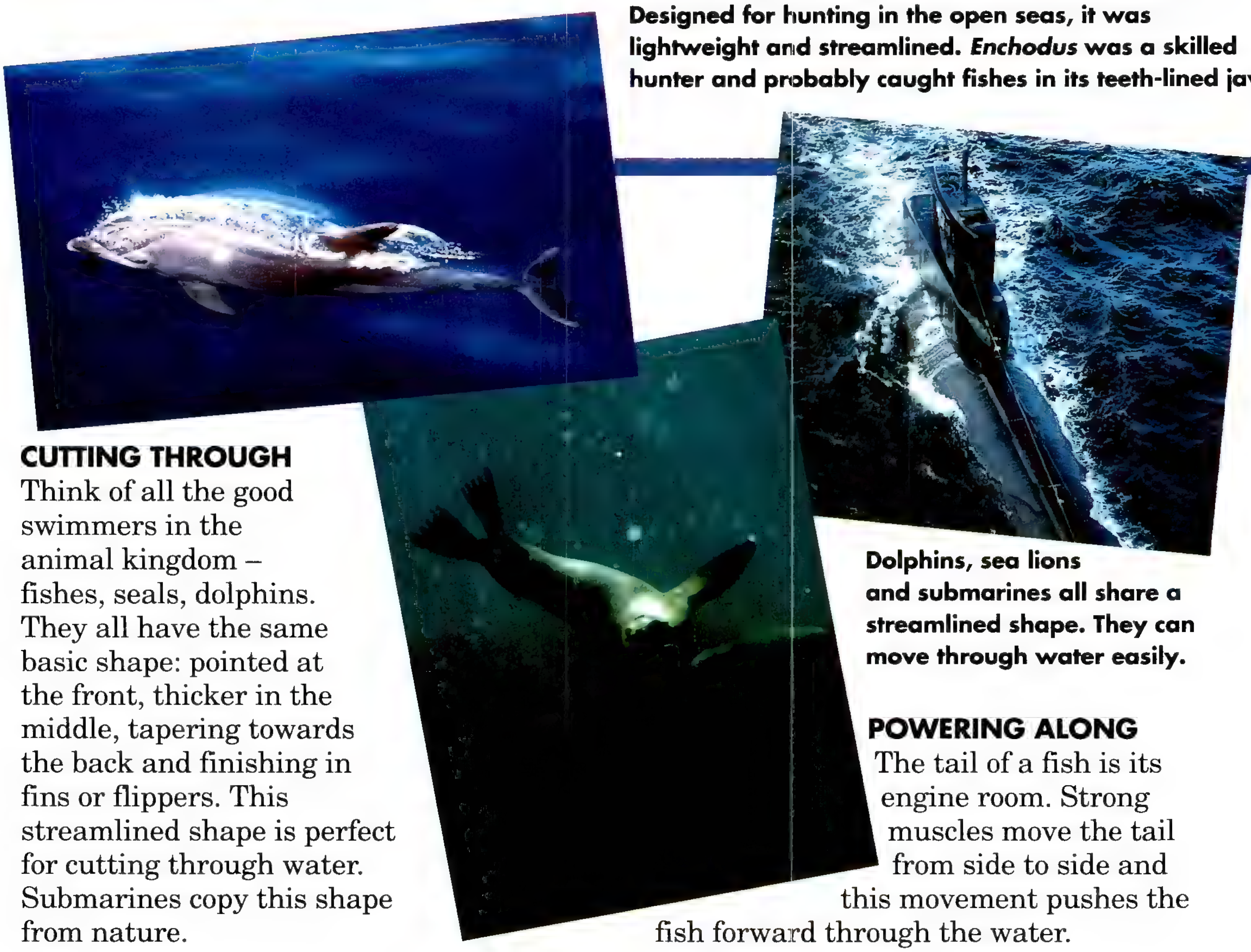
In the swim

Water is much thicker than air. To move in water, animals such as fishes have evolved special equipment.

When you dive into water you stretch your arms above your head, hands touching and make a pointed shape. As you hit the water your hands cut through it easily so that you travel faster and further.


Gill cover protects delicate gills
Eye
Rows of teeth for catching prey

***Enchodus* appeared just as the dinosaurs died out. Designed for hunting in the open seas, it was lightweight and streamlined. *Enchodus* was a skilled hunter and probably caught fishes in its teeth-lined jaws.**



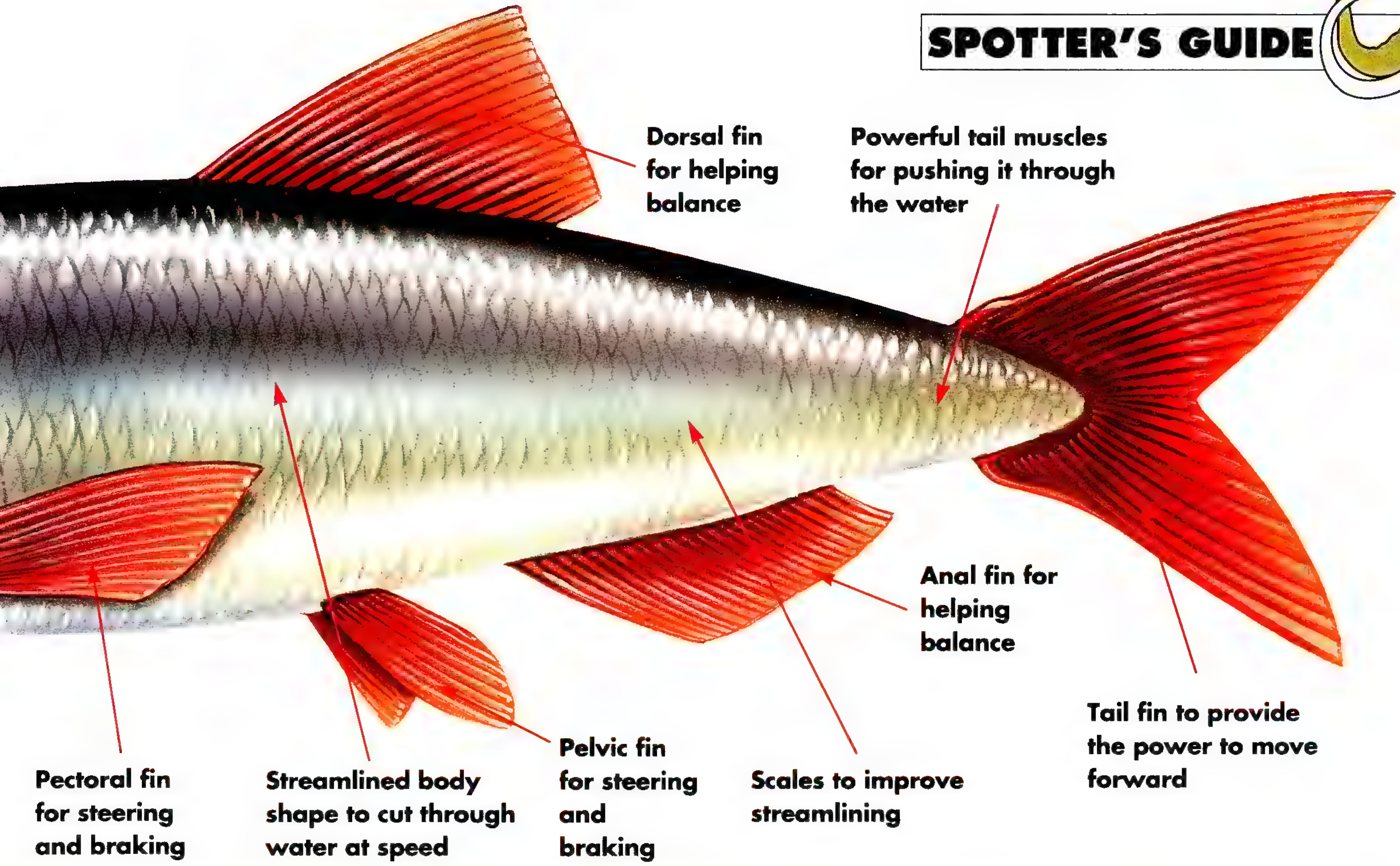
Dolphins, sea lions and submarines all share a streamlined shape. They can move through water easily.

CUTTING THROUGH

Think of all the good swimmers in the animal kingdom – fishes, seals, dolphins. They all have the same basic shape: pointed at the front, thicker in the middle, tapering towards the back and finishing in fins or flippers. This streamlined shape is perfect for cutting through water. Submarines copy this shape from nature.

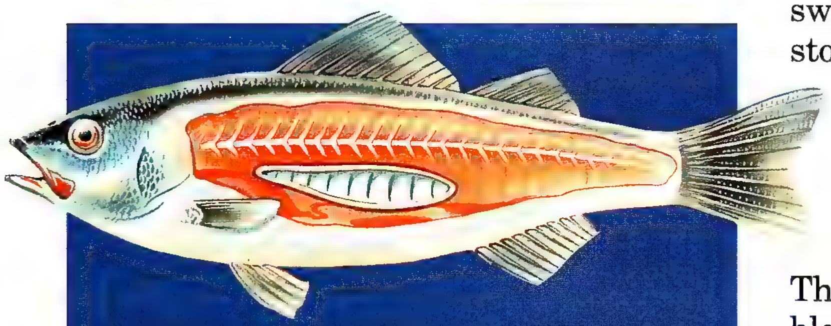
POWERING ALONG

The tail of a fish is its engine room. Strong muscles move the tail from side to side and this movement pushes the fish forward through the water.


Dorsal fin for helping balance
Powerful tail muscles for pushing it through the water
Anal fin for helping balance
Tail fin to provide the power to move forward
Pectoral fin for steering and braking
Streamlined body shape to cut through water at speed
Pelvic fin for steering and braking
Scales to improve streamlining

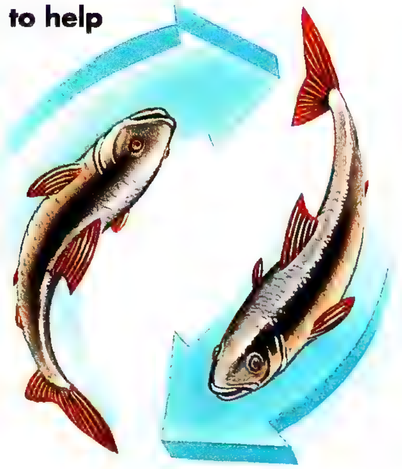
FIN AND SCALE POWER

So what are fins for? To steer, so that fishes can turn sharply to catch prey or avoid being eaten; to keep the right way up, and to brake. Early fishes had heavy armour or thick scales that slowed them down. But later fishes had thinner, closer fitting scales which made them lighter and more flexible so they could swim better and faster.



It took millions of years for fishes to evolve swim bladders like this. Some prehistoric fishes relied on rising to the surface and taking gulps of air to keep themselves afloat.

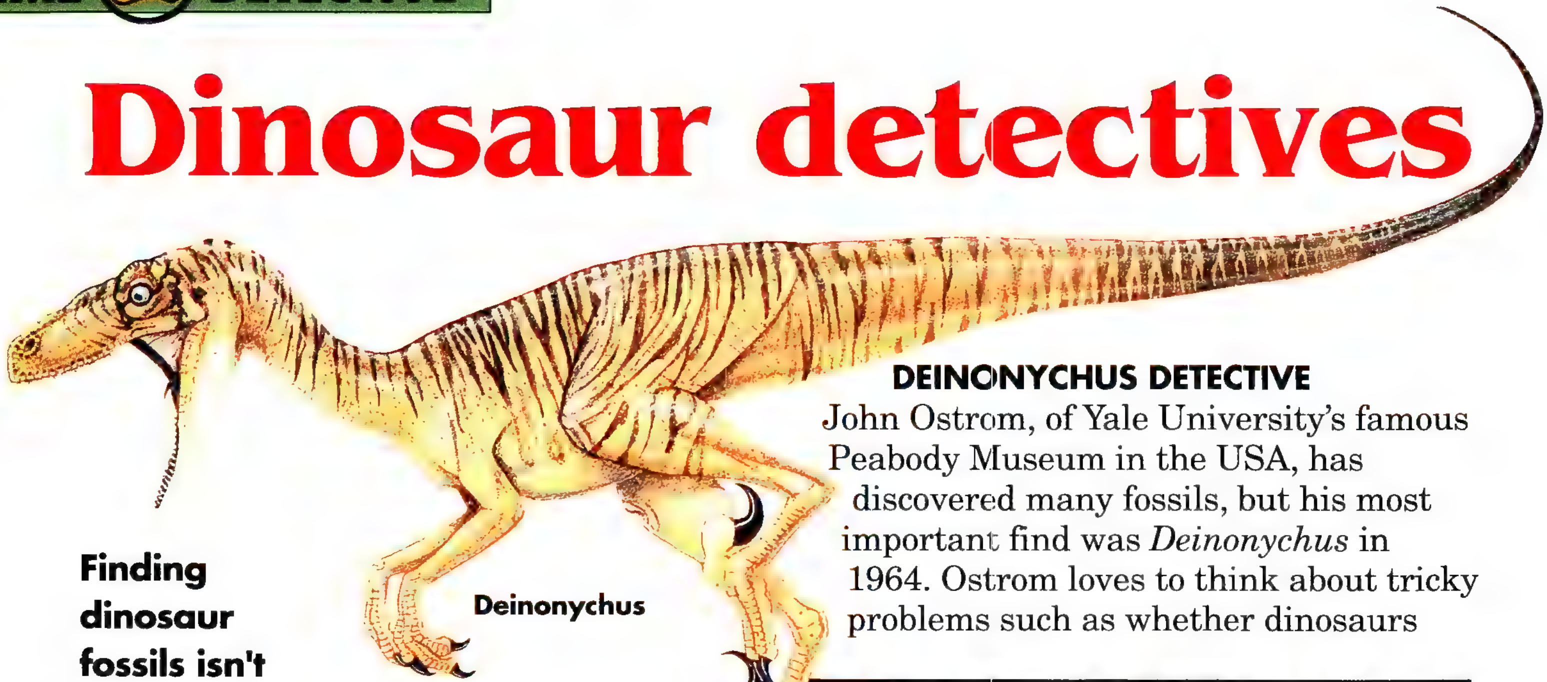
Most fishes use their fins to help them change direction.



BAGS OF GAS

Staying afloat can be difficult. It usually means swimming non-stop. But most fishes have solved this problem. They have a bag of gas in their bodies called a swim bladder. The gas is taken directly from the fishes' blood. It is lighter than water and helps keep the fish afloat. To move up and down in the water, fishes can empty the gas out of the swim bladder (they go down) or fill it (they go up).

Dinosaur detectives



Finding dinosaur fossils isn't easy. All the palaeontologists shown here have been lucky enough to make important discoveries.

Dinosaur detectives have to be quite tough. They work in some of the most remote places in the world – deserts and mountains. They travel great distances and face many dangers and discomforts to get the fossils. On top of all this, most dinosaur detectives have spent years at university studying sciences such as geology, zoology and palaeontology.

ENVIRONMENTAL SPECIALIST

Palaeontologists are not just interested in the animals themselves, but in where and how they lived. Peter Dodson, of the University of Pennsylvania, USA, has made a study of the environments in which dinosaurs lived, died and were buried. This has helped palaeontologists to a far better understanding of how dinosaurs lived. Dodson named *Avaceratops*, the small ceratopian dinosaur, after his wife.

DEINONYCHUS DETECTIVE

John Ostrom, of Yale University's famous Peabody Museum in the USA, has discovered many fossils, but his most important find was *Deinonychus* in 1964. Ostrom loves to think about tricky problems such as whether dinosaurs were endothermic ('warm blooded'). He has also done some very important work on the link between birds and dinosaurs.

John Ostrom with *Deinonychus*!

NEW IDEAS MAN

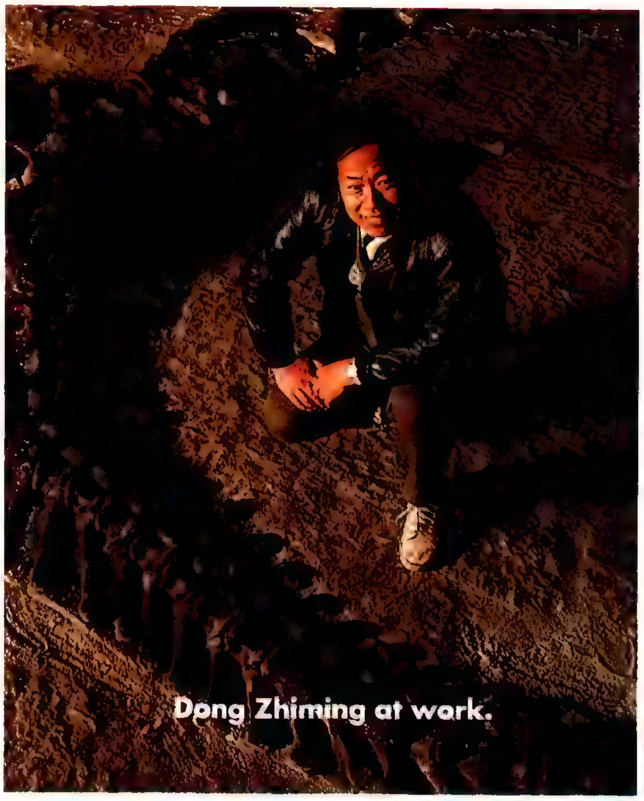
Dressed in a stetson (cowboy hat), check shirt and boots, Robert Bakker loves to stride about the hills with his dog, searching for dinosaurs. His kitchen is full of dinosaur bones! He is based at Denver Museum, Colorado, USA. Bakker is a dinosaur detective who is always coming up with new ideas.

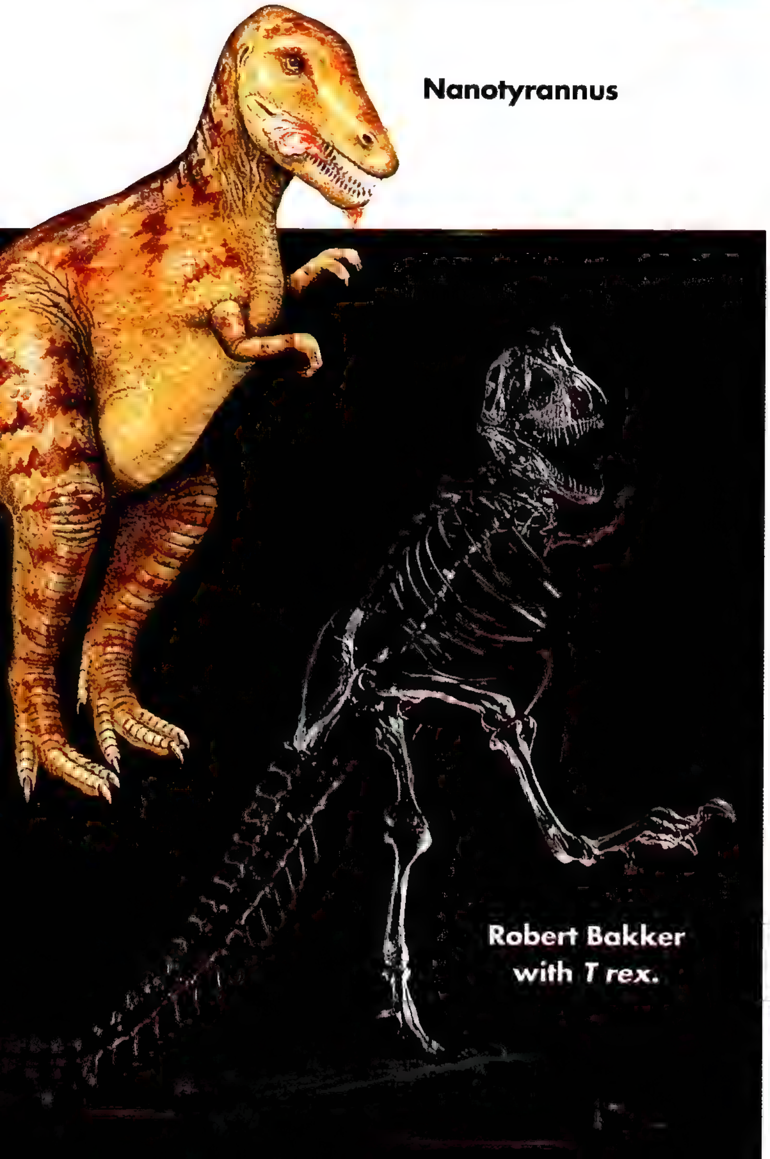
LIVELY DINOSAURS?

One of Bakker's most famous theories is that dinosaurs were not lumbering plodders but energetic and agile. With other experts, he named the dinosaur *Nanotyrannus*.

CHINESE EXPERT

Dong Zhiming has found at least nine new species of dinosaur. One of his most exciting finds was a huge number of massive *Shunosaurus* in a quarry in central China. They probably died in a great flood. Dong, who is head of Beijing University's Institute of Palaeontology, China, also discovered the carnivore *Yangchuanosaurus*.

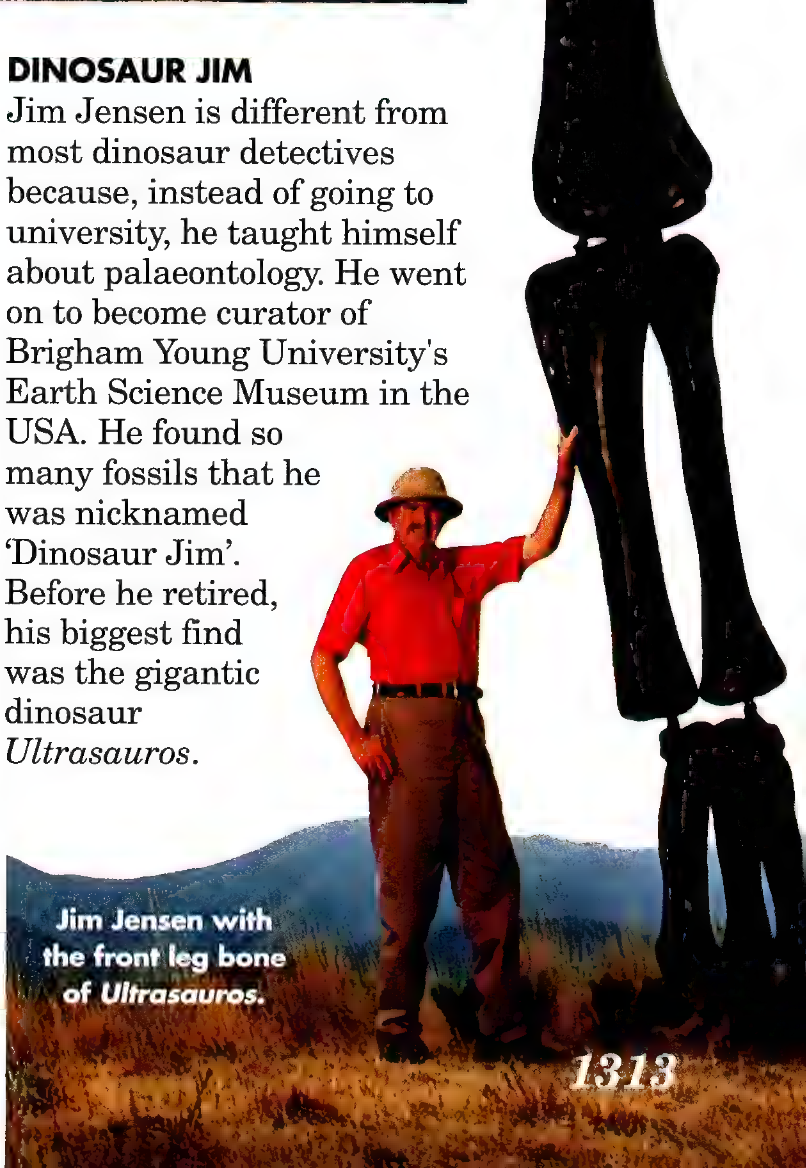

Dong Zhiming at work.


Nanotyrannus

Robert Bakker with *T rex.*

DINOSAUR JIM

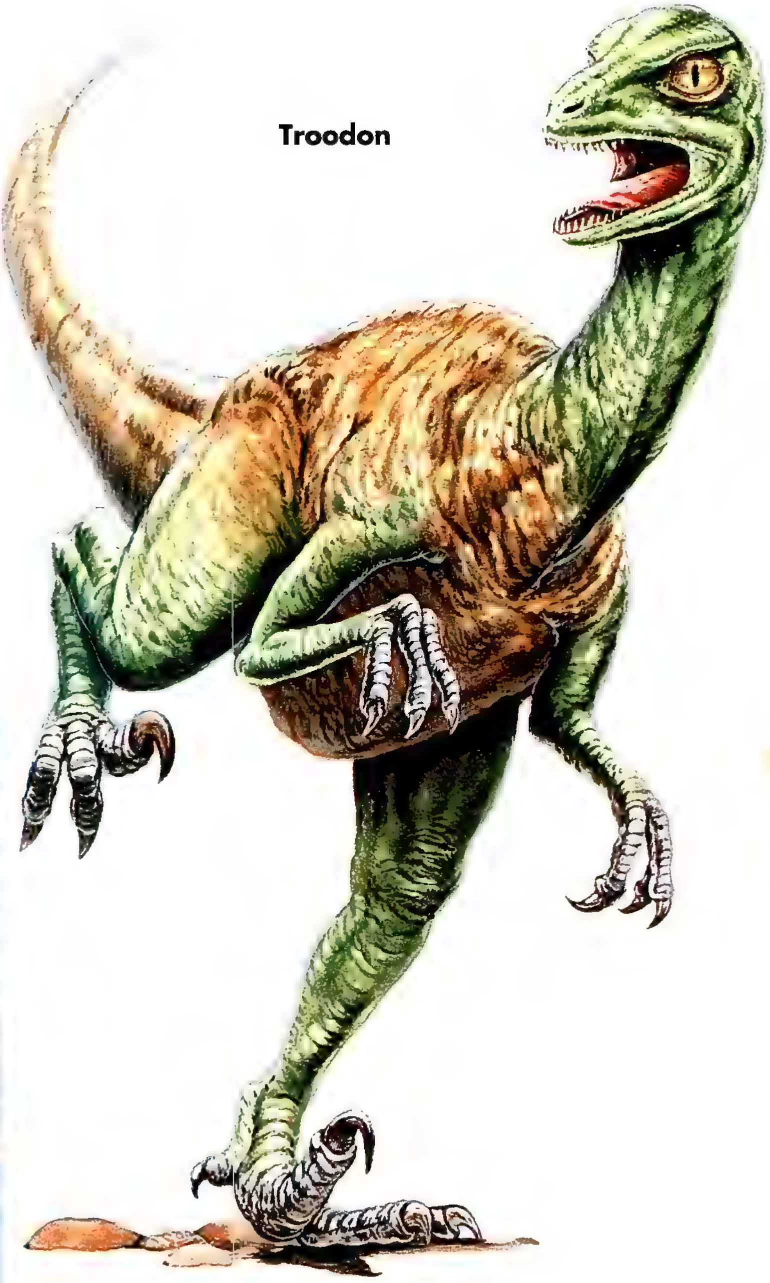
Jim Jensen is different from most dinosaur detectives because, instead of going to university, he taught himself about palaeontology. He went on to become curator of Brigham Young University's Earth Science Museum in the USA. He found so many fossils that he was nicknamed 'Dinosaur Jim'. Before he retired, his biggest find was the gigantic dinosaur *Ultrasauros*.


Jim Jensen with the front leg bone of *Ultrasauros.*

TROODON EXPERT

Philip Currie's dinosaur hunts have taken him across the world from Canada to Inner Mongolia. Currie, from the famous Royal Tyrrell Museum in Alberta, Canada, is one of the most successful dinosaur hunters in North America. With other fossil hunters, he made an enormous number of finds in Alberta, in the area now called Dinosaur Provincial Park. He has found large numbers of *Hadrosaur* babies, including nests and eggs. He is an expert on the highly intelligent, bird-like *Troodon*.

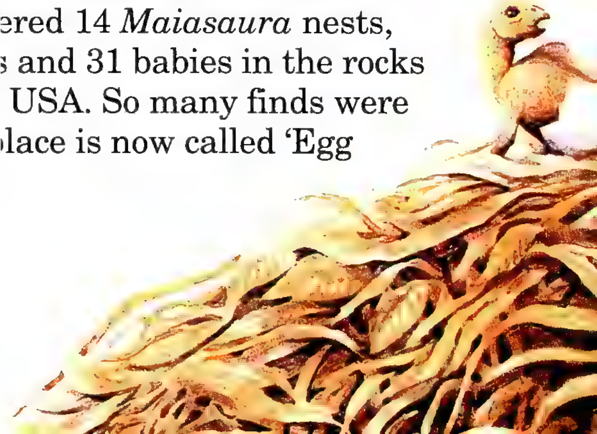
Philip Currie



Troodon

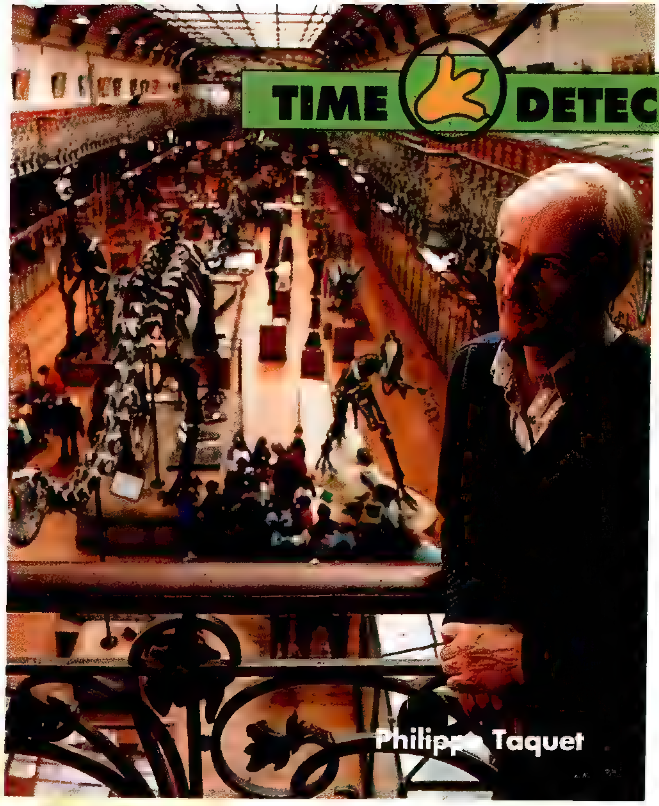
EGGSPERT HUNTER

Jack Horner is best known for discovering that *Maiasaura* looked after its young after they hatched. *Maiasaura* means 'good mother lizard'. Horner (of the Museum of the Rockies, USA) and his team discovered 14 *Maiasaura* nests, with 42 eggs and 31 babies in the rocks of Montana, USA. So many finds were made, this place is now called 'Egg Mountain'.

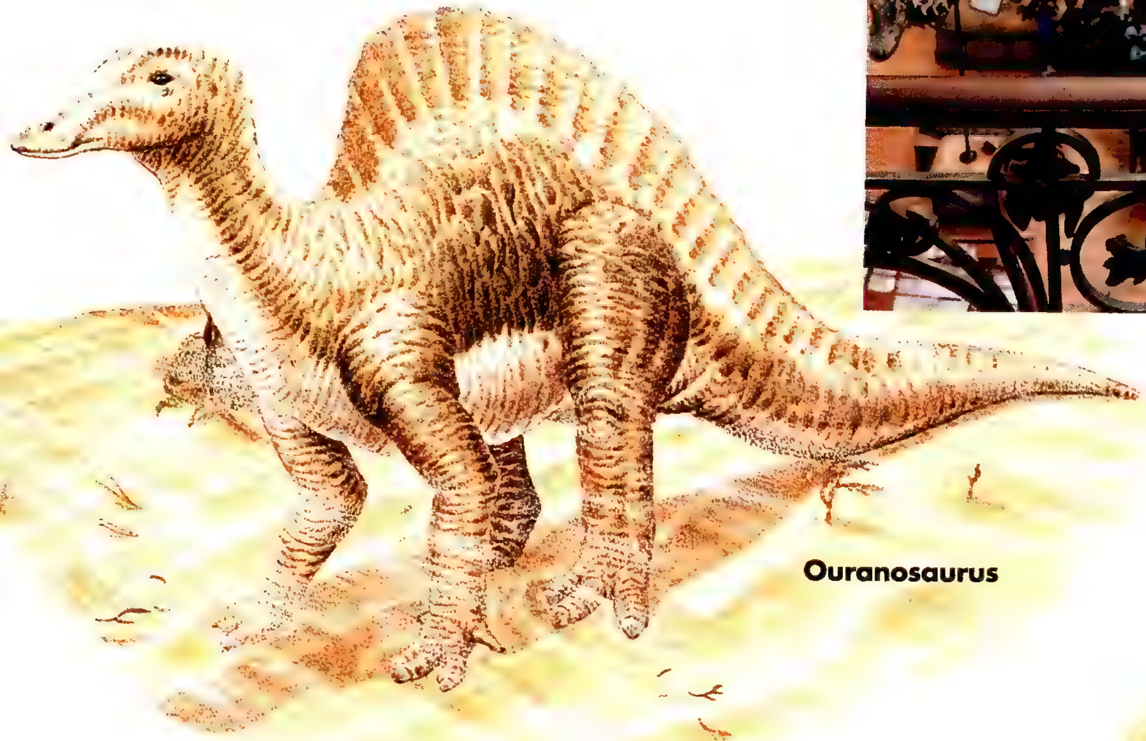


DESERT DETECTIVE

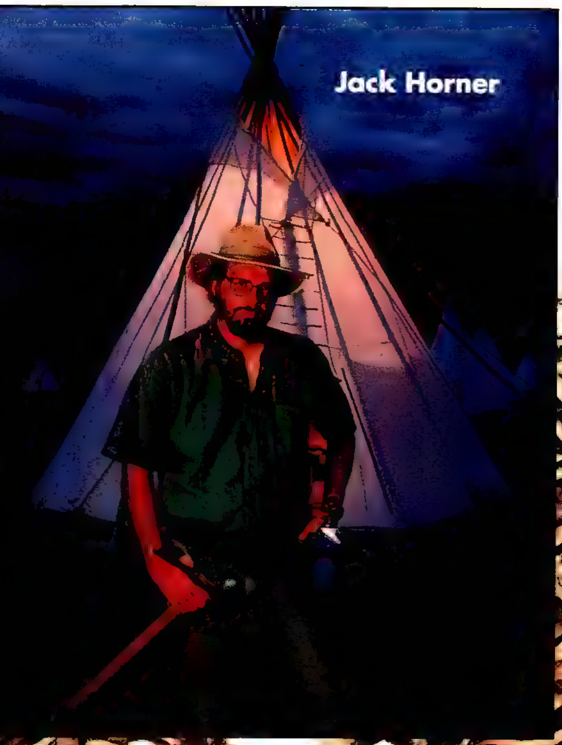
The French dinosaur expert Philippe Taquet, has made several expeditions to the great Sahara Desert in North Africa. There, in the sweeping sands, he discovered the extraordinary dinosaur *Ouranosaurus*, a plant-eater with a huge fin-like sail on its back.



Philippe Taquet



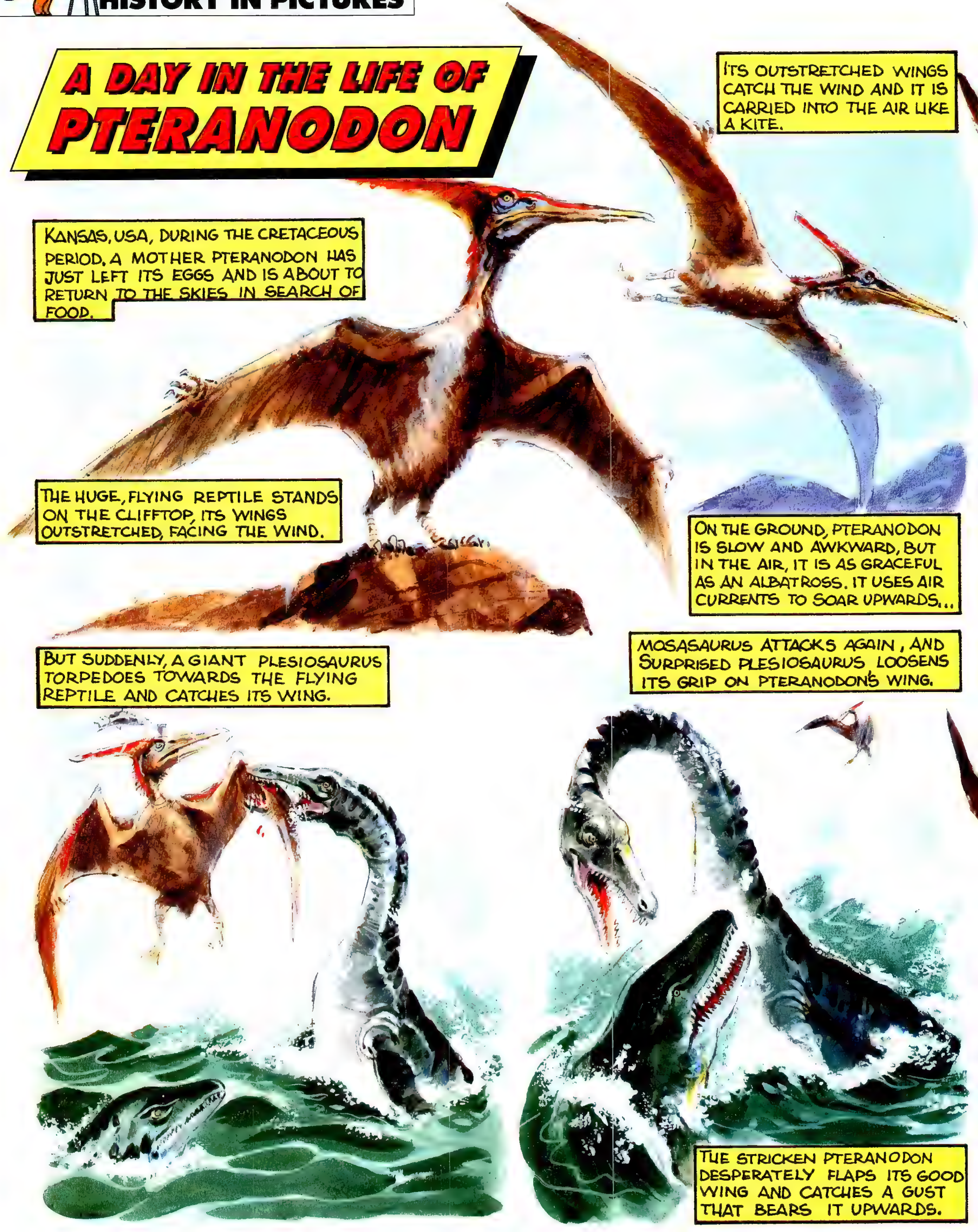
Ouranosaurus



Jack Horner

Maiasaura

A DAY IN THE LIFE OF PTERANODON



KANSAS, USA, DURING THE CRETACEOUS PERIOD. A MOTHER PTERANODON HAS JUST LEFT ITS EGGS AND IS ABOUT TO RETURN TO THE SKIES IN SEARCH OF FOOD.

THE HUGE, FLYING REPTILE STANDS ON THE CLIFFTOP, ITS WINGS OUTSTRETCHED, FACING THE WIND.

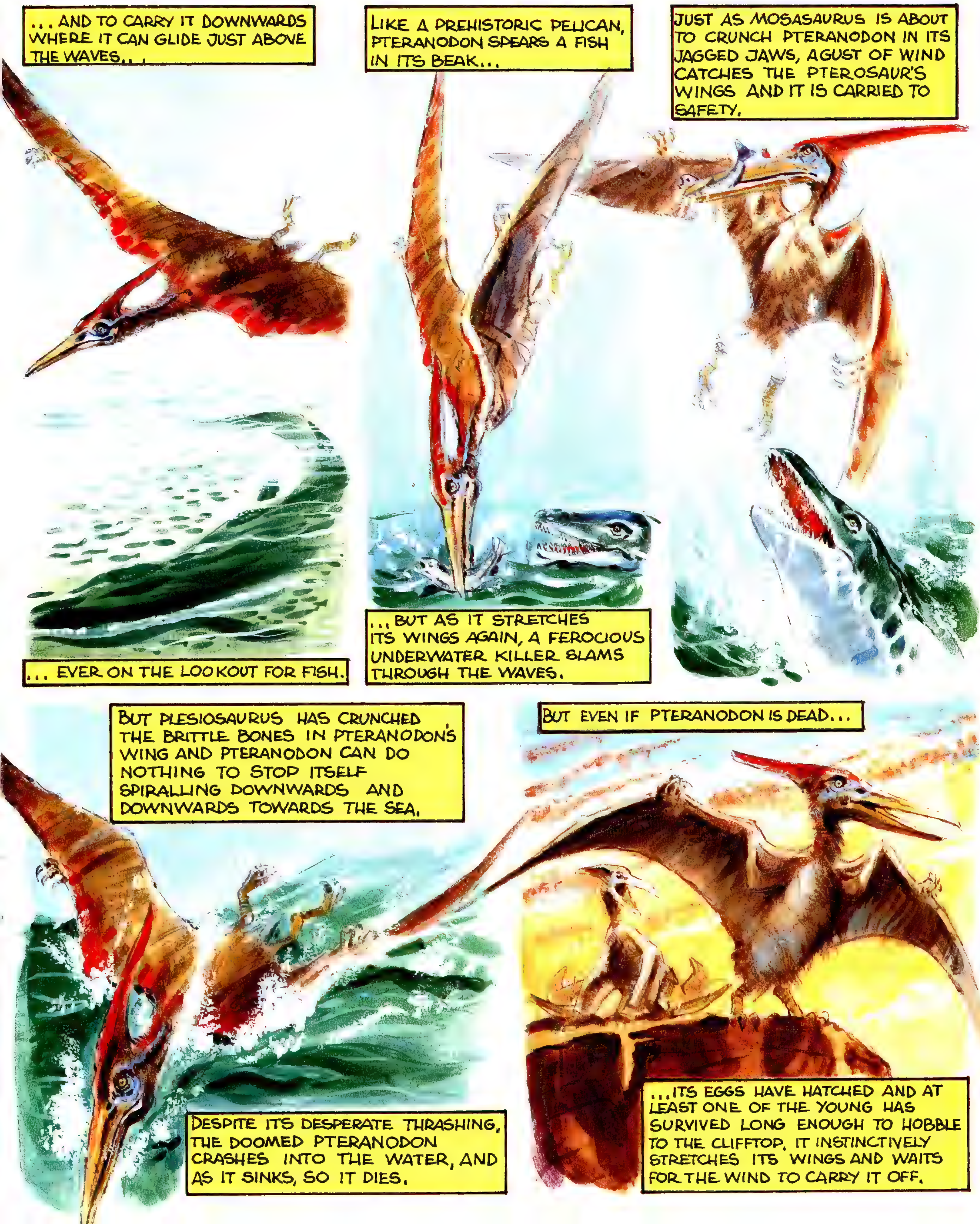
ITS OUTSTRETCHED WINGS CATCH THE WIND AND IT IS CARRIED INTO THE AIR LIKE A KITE.

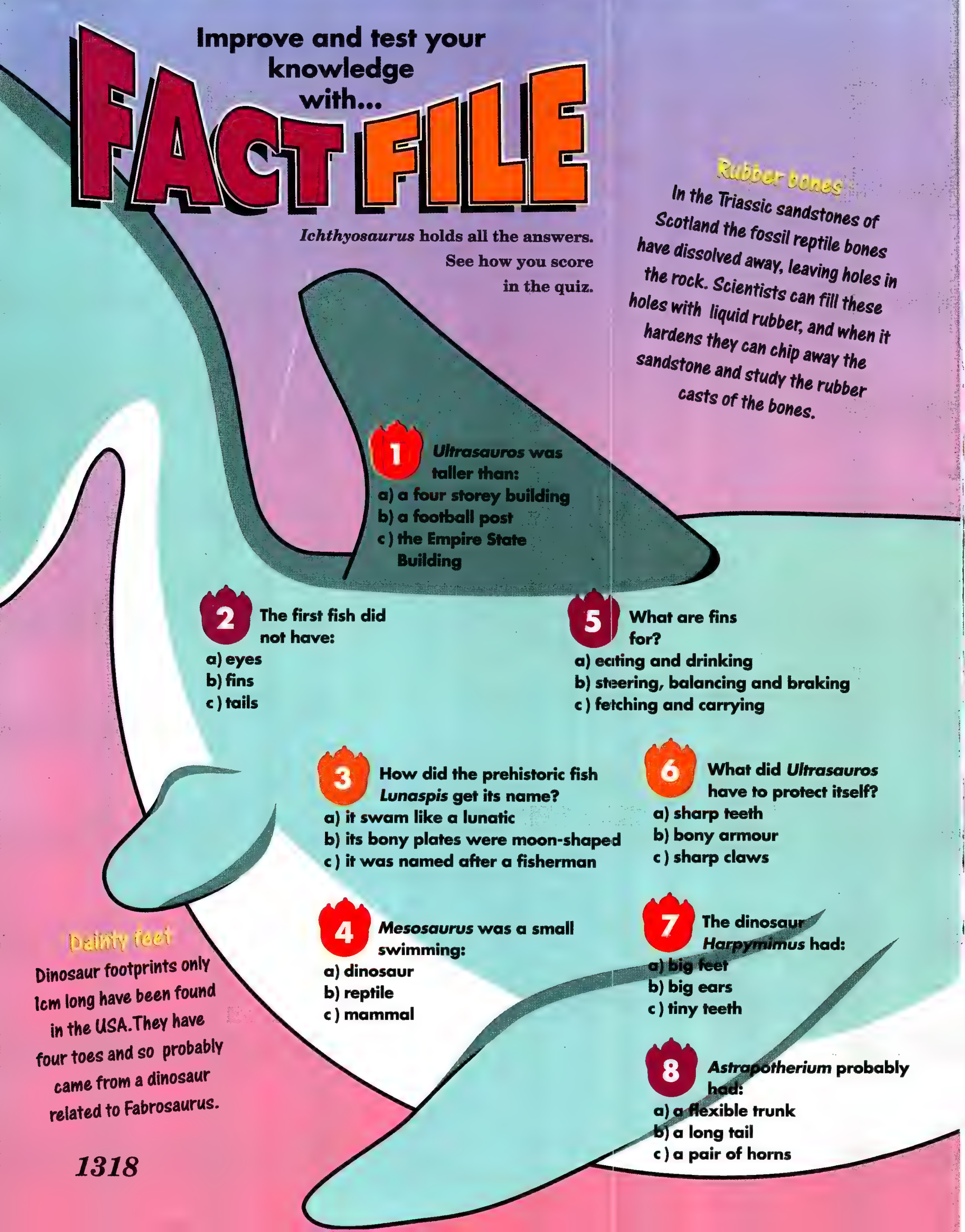
ON THE GROUND, PTERANODON IS SLOW AND AWKWARD, BUT IN THE AIR, IT IS AS GRACEFUL AS AN ALBATROSS. IT USES AIR CURRENTS TO SOAR UPWARDS...

BUT SUDDENLY, A GIANT PLESIOSAURUS TORPEDOES TOWARDS THE FLYING REPTILE AND CATCHES ITS WING.

MOSASAURUS ATTACKS AGAIN, AND SURPRISED PLESIOSAURUS LOOSENS ITS GRIP ON PTERANODON'S WING.

THE STRICKEN PTERANODON DESPERATELY FLAPS ITS GOOD WING AND CATCHES A GUST THAT BEARS IT UPWARDS.


... AND TO CARRY IT DOWNWARDS WHERE IT CAN GLIDE JUST ABOVE THE WAVES...
... EVER ON THE LOOKOUT FOR FISH.
LIKE A PREHISTORIC PELICAN, PTERANODON SPEARS A FISH IN ITS BEAK...
... BUT AS IT STRETCHES ITS WINGS AGAIN, A FEROCIOUS UNDERWATER KILLER SLAMS THROUGH THE WAVES.
JUST AS MOSASAURUS IS ABOUT TO CRUNCH PTERANODON IN ITS JAGGED JAWS, AGUST OF WIND CATCHES THE PTEROSAUR'S WINGS AND IT IS CARRIED TO SAFETY.
BUT PLESIOSAURUS HAS CRUNCHED THE BRITTLE BONES IN PTERANODON'S WING AND PTERANODON CAN DO NOTHING TO STOP ITSELF SPIRALLING DOWNWARDS AND DOWNWARDS TOWARDS THE SEA.
DESPITE ITS DESPERATE THRASHING, THE DOOMED PTERANODON CRASHES INTO THE WATER, AND AS IT SINKS, SO IT DIES.
BUT EVEN IF PTERANODON IS DEAD...
... ITS EGGS HAVE HATCHED AND AT LEAST ONE OF THE YOUNG HAS SURVIVED LONG ENOUGH TO HOBBLE TO THE CLIFFTOP. IT INSTINCTIVELY STRETCHES ITS WINGS AND WAITS FOR THE WIND TO CARRY IT OFF.



Improve and test your knowledge with...

FACT FILE

Ichthyosaurus **holds all the answers. See how you score in the quiz.**

Rubber bones

In the Triassic sandstones of Scotland the fossil reptile bones have dissolved away, leaving holes in the rock. Scientists can fill these holes with liquid rubber, and when it hardens they can chip away the sandstone and study the rubber casts of the bones.

1 ***Ultrasauros*** **was taller than:**
a) a four storey building
b) a football post
c) the Empire State Building

2 **The first fish did not have:**
a) eyes
b) fins
c) tails

3 **How did the prehistoric fish *Lunaspis* get its name?**
a) it swam like a lunatic
b) its bony plates were moon-shaped
c) it was named after a fisherman

4 ***Mesosaurus*** **was a small swimming:**
a) dinosaur
b) reptile
c) mammal

5 **What are fins for?**
a) eating and drinking
b) steering, balancing and braking
c) fetching and carrying

6 **What did *Ultrasauros* have to protect itself?**
a) sharp teeth
b) bony armour
c) sharp claws

7 **The dinosaur *Harpymimus* had:**
a) big feet
b) big ears
c) tiny teeth

8 ***Astrapotherium*** **probably had:**
a) a flexible trunk
b) a long tail
c) a pair of horns

Dainty feet

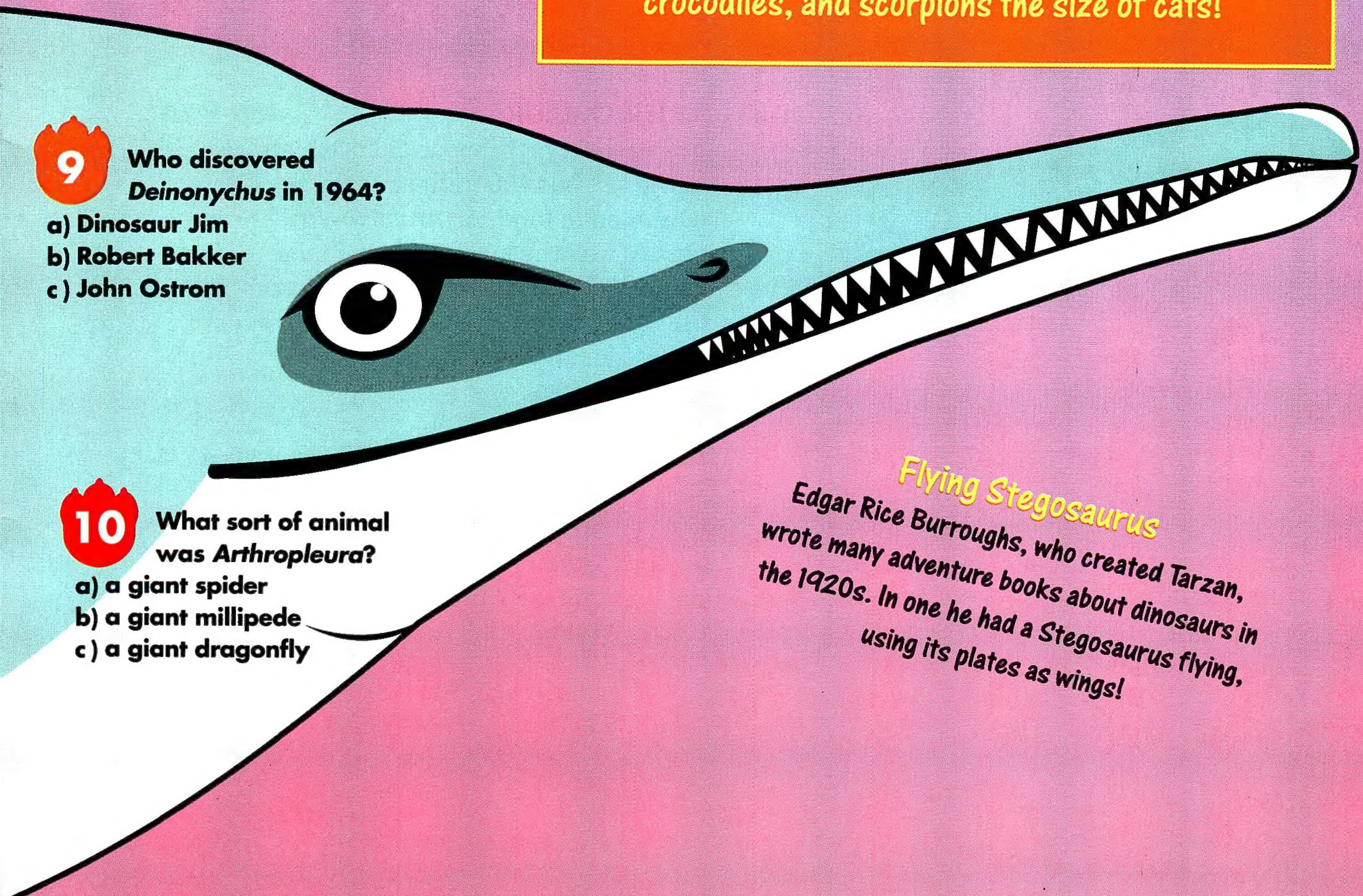
Dinosaur footprints only 1cm long have been found in the USA. They have four toes and so probably came from a dinosaur related to Fabrosaurus.

Red or black?

Most pictures of mammoths show them with reddish hair. This is because the mammoth hair found preserved in frozen mud is red. Experts now think the colour changed over the centuries, and the original mammoth hair colour was black.

Creepy zoo

In the Carboniferous coal forests there were dragonflies as big as macaws, centipedes as big as crocodiles, and scorpions the size of cats!



9 Who discovered *Deinonychus* in 1964?

a) Dinosaur Jim
b) Robert Bakker
c) John Ostrom

10 What sort of animal was *Arthropleura*?

a) a giant spider
b) a giant millipede
c) a giant dragonfly

Flying Stegosaurus

Edgar Rice Burroughs, who created Tarzan, wrote many adventure books about dinosaurs in the 1920s. In one he had a Stegosaurus flying, using its plates as wings!

Answers to the questions on inside back cover

ARGENTAVIS **6 MYA**

A huge bird of prey, *Argentavis* (ar-gen-ta-vis) had a wing span of seven metres or more. *Argentavis* looked like a giant vulture with large, clawed feet and a sharp, hooked beak. Its name means 'Argentina bird' after the place where it lived. *Argentavis* probably hunted by day and plucked its victims from the ground. It may also have fed on the flesh of dead animals.

ARSINOITHERIUM **36 MYA**

Arsinoitherium (ar-sin-oy-thee-ree-um) was as long as a rhinoceros. It had a great bulky body supported by four sturdy legs. Just above its snout, two large, hollow horns stood out. Like the hornlets on a giraffe's head, they were covered by skin. *Arsinoitherium* lived in Egypt and the Middle East and fed on tough leaves and plants. Its name means 'Queen Arsinoe's beast'.

MYA = MILLION YEARS AGO

ARTHROLYCOSA **370 MYA**

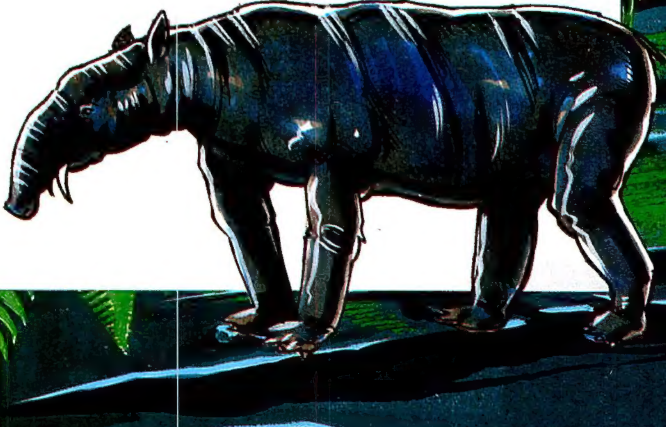
Arthrolycosa (ar-thro-lie-koza) was one of the first known spiders. It had eight long legs and eight eyes. *Arthrolycosa* probably caught insects by attacking them with poisoned 'fangs' which stood out in front of its mouth.

ARTHROPLEURA **400 MYA**

The earliest arthropods ('jointed legs') lived in the sea but 400 million years ago they moved on to land. *Arthropleura* (ar-throw-plu-ra) was the largest known land arthropod and its flat body was longer than that of a modern leopard. It was like a huge millipede, and lived on the rotting leaves of ancient forests.

ASTRAPOTHERIUM **20 MYA**

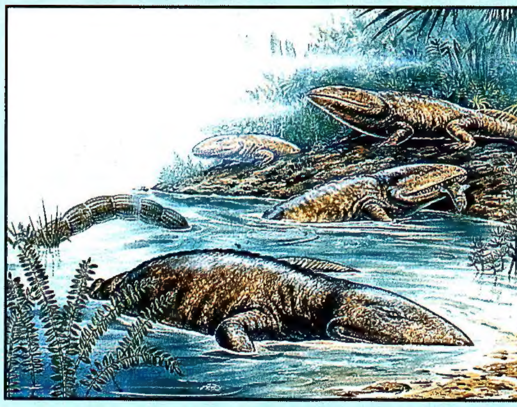
This plant-eating mammal from Argentina looked like a cross between a rhinoceros and a baby elephant. *Astrapotherium* (as-trap-o-thee-ree-um) probably had a small, flexible trunk. Its name means 'star beast'.

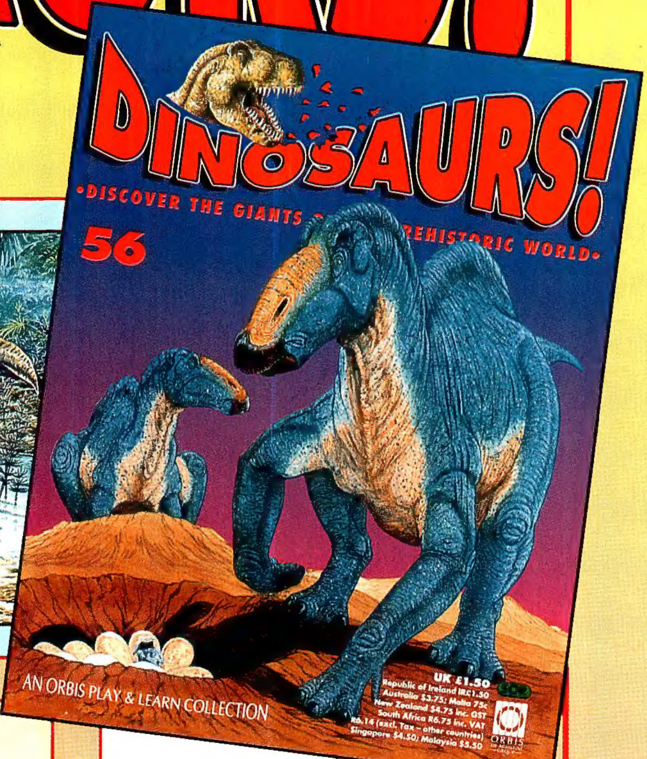


COMING IN PART 56 OF

DINOSAURS!

Find out why fishes began to walk in TIME DETECTIVE. Discover the wondrous world of the early sharks in PREHISTORIC WORLD.

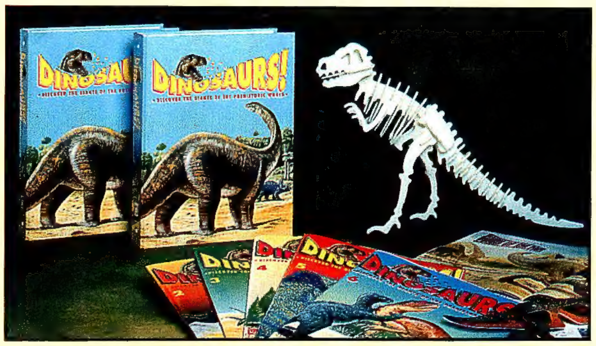



DINOSAURS!
•DISCOVER THE GIANTS OF THE PREHISTORIC WORLD•
56
AN ORBIS PLAY & LEARN COLLECTION
UK £1.50
Republic of Ireland IR£1.50
Australia $3.75; Malta 75c
New Zealand $4.75 inc. GST
South Africa R6.75 inc. VAT
R6.14 (excl. Tax – other countries)
Singapore $4.50; Malaysia $5.50
ORBIS

Keep your DINOSAURS! safe

Keep your copies safe and neat with these fantastic binders.

Your binders have been designed to look good at home or at school. Each is sturdy and hardwearing – it even has a wipe-clean cover – and holds 13 issues. You'll want to use your DINOSAURS! collection again and again – for reference, for school projects, or just for fun. So don't let your copies go missing; keep them in your own set of binders.



DINOSAURS! **binders are now available and cost just £4.95 (including £1 p&p). Please refer to the information on the inside front cover or telephone 0424 755755 for details.**

PLUS

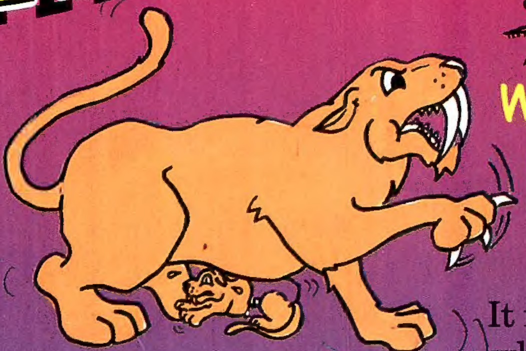
Fascinating prehistoric land and sea creatures in IDENTIKIT
and
SPOTTER'S GUIDE
GIANTS OF THE PAST
3-D GALLERY
HISTORY IN PICTURES

PICTURE CREDITS: Front cover: Peter David Scott/WLAA. Natural History Museum, London IFC, 1302; NHPA 1303 T, 1305 T, 1310 B, 1310 CL; Louis Psihoyos/Matrix/Colorific 1312, 1312/3 B, 1313 T, 1313 L, 1314 L, 1315 TR, 1315 BL; Mark A. Philbrick/Brigham Young University 1299; Planet Earth 1303 C, 1315 B; Zefa 1310 CR
Artwork: Black Hat 1320; Robin Boudell/WLAA 1306/7; R. Carter/WLAA 1310, 1311 CL, 1311 CR, 1318/9; B. Croucher 1315 C; Wayne Ford/WLAA 1312/3; P. Gascoine 1316/7; Tim Hayward 1314; James Higgins/WLAA 1304; D. McHale BC; Nick Pike 1300, 1301; Steve Roberts/WLAA 1302 T, 1302 B, 1303, 1304/5; G. Rosewarne 1312 T; Peter David Scott/WLAA 1297, 1298/9, 1315; Steve White 1308/9

ANSWERS TO FACT FILE QUESTIONS: 1.a 2.b 3.b 4.b 5.b 6.c 7.c 8.a 9.c 10.b

Dr. David Norman of Cambridge University answers your dinosaur questions

ASK THE EXPERT



Did prehistoric mammals protect their young after they had been born?

Yes. One of the characteristics of mammals is that they rear their young from birth. The mother gives birth to her babies and then suckles them on her milk. During this time the young grow very quickly (mother's milk is very nutritious) and get an education in how to survive.

Why did amphibians like Ichthyostega lay their eggs in water?

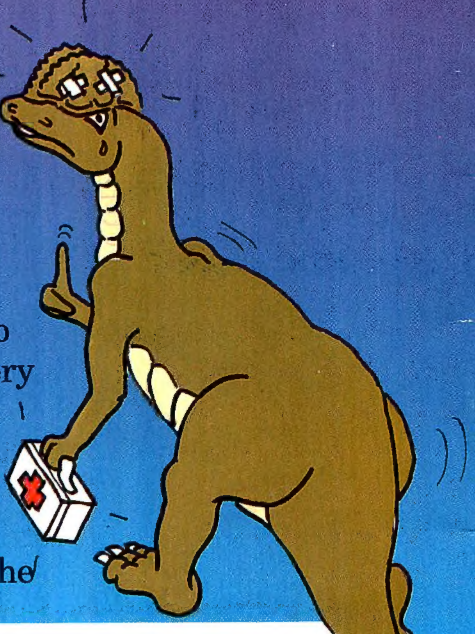
Ichthyostega was one of the first animals capable of walking on land. It had evolved from fishes, and it simply kept the habit of reproducing in water. It is also the case that animals such as *Ichthyostega* spent a great deal of time in water. They still used gills for breathing for at least part of the time, and had a long fin on their tail which shows that they were accomplished swimmers. So animals like *Ichthyostega* laid eggs in water because it was the obvious thing to do!

Why have no 'giant' mammals survived while smaller ones have?

It is a very sad fact that when humans first appeared in significant numbers in the fossil record about 10,000 years ago, the larger mammal groups declined very rapidly. It seems likely that early human hunters killed all the large mammals and that is why mammoths the size of dinosaurs are no longer with us.

Has the crest of Dilophosaurus ever been found in one piece?

Dilophosaurus' crest, probably used to frighten enemies or to attract mates, was very delicate. We have not found a complete pair of these ridges on any skull so far. Since we only know the shape of the base of the crest, we can only guess at its exact shape.



55
9 771351 122017